



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

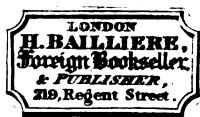
Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



LIBRERIA ESTRANGERA

CIENTIFICA Y LITERARIA

DE Carlos BAILLY-BAILLIERE.

MADRID, *calle del Principe*, núm. 11.

Surtido completo de obras francesas de *teología, filosofía, jurisprudencia, matemáticas, arquitectura, mineralogía, medicina alopatética y homeopática, cirugía, anatomía, farmacia, fisiología, hidropatía, magnetismo, historia natural, química, física, arte militar, agricultura, veterinaria, literatura, economía política*, etc. Libros ingleses, alemanes é italianos.

Diccionarios de todas lenguas.

Se reciben suscripciones á todas las obras y periódicos extranjeros y nacionales.

Igualmente toda clase de obras para la venta en comision.

Y como corresponsal de los señores *BIESTA, LABOULAYE* y compañía, fundicion general de caracteres franceses y extranjeros, admite los encargos que le hagan los impresores de la misma.

NOTA. Una correspondencia activa con Alemania etc. y tambien con las principales ciudades de Europa, permite al Sr. BAILLY-BAILLIERE, de cumplir con toda exactitud y veracidad cualquier comision que se le confie.

~~80-2-23~~



UNIVERSIDAD COMPLUTENSE



5321300849

Elem.^{tos} de Jurisprudencia médica exparidos
con una elección abundante de casos curiosos
e instructivos, y el análisis de las opiniones --
emitidas p.^r los encargados de la Autoridad ju-
dicial.

621728719

22

D E 340.6
TAY

ELEMENTS
OF
MEDICAL JURISPRUDENCE,
INTERSPERSED WITH
A COPIOUS SELECTION
OF
CURIOUS AND INSTRUCTIVE CASES
AND
ANALYSES OF OPINIONS DELIVERED AT CORONERS' INQUESTS.



BY
ALFRED S. TAYLOR, F.L.S.
LECTURER ON MEDICAL JURISPRUDENCE AND CHEMISTRY IN GUY'S HOSPITAL.

Weniges aus Vielem. Eine kleine Auswahl aus einer unüberschbaren Menge.
CARUS. Grunds. der vergl. Anat.

LONDON:
DEACON, GEORGE YARD, LOMBARD STREET.
MDCCCXLIII.

P R E F A C E .

In presenting this volume to the Profession, I cannot but feel how imperfectly I have fulfilled the object which I had in view, namely,—of rendering it a practical guide for the Medical Jurist. It has long been an acknowledged fact, that no branch of literature is so deficient in this country, as that of Medical Jurisprudence. A few treatises only have as yet appeared, and these, partly from a want of practical application in the details, and partly in consequence of the medico-legal illustrations being drawn from old and recondite sources, have not succeeded to any great extent, in preparing the British medical practitioner for those duties which he is occasionally called upon to perform. Let it not be considered, that, by these remarks, I intend to derogate from the labours of those of my countrymen, who have preceded me in their literary contributions to this science:—the novelty of the subject of which they were treating, as well as the absolute want of all authorities in their own tongue, are circumstances which satisfactorily account for the deficiencies that exist in their writings; they are indeed deficiencies, belonging to the time at which they wrote, or arising from the paucity of materials upon which they had to work. But I fear such an apology will

scarcely be admitted in extenuation of the defects of the present volume ; since the attention of the profession has been roused to the importance of the science, and within a comparatively recent period, a great and rapid advance has been made in some of those branches of medicine which lend to Medical Jurisprudence its chief lustre. So far as it lay within my limited means, I have endeavoured to collect and arrange the most recent facts and observations ; and should some important points have been omitted, or others but imperfectly noticed, I must plead the difficulties which any single individual necessarily encounters, when, in order to illustrate his subject, he is called upon to extend his researches through so many different departments of science.

For several years past, I have devoted a close attention to the progress of criminal jurisprudence in this country ; and through the kindness of many excellent friends in the professions of Law and Medicine, have been enabled to collect a number of cases which will probably render the work in this respect useful. To many of these cases, a few remarks have been subjoined, in order that it might be seen how far the evidence given by a witness, or the course of examination pursued by a barrister, was consistent with the approved doctrines of Medical Jurisprudence.

Among the subjects contained within this volume,¹ considerable space has been devoted to the medico-legal history of wounds ; and I trust the Medical Jurist

¹ In a second volume, which will complete the work, I propose to treat of TOXICOLOGY, FÆTICIDE, INFANTICIDE and INSANITY, in relation to Medical Jurisprudence.

will find, that no point of practical interest has been here omitted. Trials for murder and manslaughter by wounding, are very frequent in our Courts of Law; and I flatter myself that the copious selection of modern cases which are dispersed through the concluding chapters of the volume, will point out to the practitioner those questions which he is most commonly required to answer, and for the elucidation of which, medical evidence is indispensable. The remarks on the Statute Law relating to wounds criminally inflicted, have been added in imitation of the example of most writers on Legal Medicine. This course has been pursued, not because a medical witness is ever liable to be questioned respecting the law of a case,—but because he may know what is likely to be the effect of his opinions on the fate of a fellow-creature; and, therefore, be led to use a proportionate degree of caution in the preparation and delivery of his evidence.

The application of Medical Jurisprudence to the purposes of Legislation, has been forcibly dwelt on by writers far better qualified for the task than myself. Alterations have been repeatedly required in laws relating to offences against the person, from a want of conformity in their provisions to the sound doctrines of medical science.¹ I have ventured, and I hope it will not be considered presumptuously, to submit our

¹ “So hat nun auch die neue Zeit eine alte, sich oft nur in geistlosen Formen bewegende Juristerei zu Grabe getragen und dafür das wahre Dogma geboren, dass Gesetzgebung und Rechtspflege ohne Anthropologie und Psychologie nur zu elender Barbarei führen.”
FRIEDREICH. *Syst. Handb. der gerichtl. Psychol.* Leipzig, 1835.

present statute law to a rigorous medico-legal analysis, and to place its provisions in contrast with those of the Penal Code of France. From this analysis, I think it will be obvious, that unless a due regard be had to the principles of Medicine in the framing of these statutes, it is impossible that our Criminal Law can be rendered that which it ought to be,—equable in its provisions, effective in its operation, and universally applicable to the repression of crime.

*Cambridge Place, Regent's Park,
Jan. 27th, 1836.*

CONTENTS.

INTRODUCTION.

Medical Jurisprudence omitted in the course of study prescribed for English surgeons,—a knowledge of it necessary to the *surgeon*,—interesting applications of the science,—indifference of the legislature to the qualifications of medical witnesses. Medical evidence on questions of poisoning, wounds and infanticide,—observations on the law of evidence,—law relative to the admission of notes or memoranda in evidence,—consequences of a neglect of the science,—medical men exposed to trials for misdemeanours. Importance of a knowledge of the subject to *barristers*,—defective examination of medical witnesses,—ignorance of the meaning of common professional terms,—inability to decide upon the correctness of a witness's answers. A knowledge of the principles of the science necessary to a *judge*—also to a *coroner*,—consequences of a neglect of the subject on the part of a coroner - - Pages 1 to 29

CHAPTER I.

ON ASPHYXIA.

Difference between asphyxia and syncope,—causes of asphyxia direct or indirect,—phenomena of asphyxia,—theories of Bichat and Legallois,—theory proposed by Dr. Kay,—examination of these theories,—state of the circulation in asphyxia,—circulation of venous blood. Goodwyn's hypothesis respecting the action of venous blood upon the heart,—proofs of the arrest of the circulation in the lungs,—post-mortem appearances in the bodies of those who have died from asphyxia,—influence of respiration on the pulmonary circulation,—other causes which may facilitate the passage of the blood through the lungs,—causes assigned by Bichat for the obstruction to the pulmonary circulation,—general conclusions. Influence of venous blood on muscular contractility. Dr. Edwards's experiments on this subject,—effect of venous blood when circulated through

the brain,—arrest of the cerebral and nervous functions,—difficulties attendant on the performance of satisfactory experiments,—analogical inferences from experiments on animals. General conclusions on the cause of death in asphyxia,—applications of a knowledge of this subject, in medico-legal investigations relative to drowning, hanging, strangulation and suffocation - - - - - Pages 31 to 61

CHAPTER II.

REAL AND APPARENT DEATH.

Nature of the subject,—observations of Winslow and Bruhier,—questions proposed for examination,—evidence of real death, on what founded. Signs of dissolution:—I. *Facies Hippocratica*. II. The state of the eyes,—objections to the supposed infallibility of this sign. III. State of the skin in real death. IV. State of the muscular system,—cadaverous irritability,—cadaverous rigidity,—order in which it attacks the muscles,—period of its accession,—period of its duration,—the rigidity not influenced by the nervous system,—a constant attendant on death,—rigidity observed in certain diseases,—conclusion respecting this sign of death. V. Loss of animal heat,—time required for the cooling of the body,—circumstances which accelerate or retard it,—coldness of the body in malignant cholera,—return of animal heat after death,—coldness of disease distinguished from that of death,—loss of sense and motion. VI. Cessation of respiration and circulation,—phenomena observed in the interruption of these processes,—voluntary power of suspending the action of the heart and lungs,—case of Colonel Townshend,—state of hybernation in animals. VII. Putrefaction, an infallible evidence of death,—changes produced by this process in the dead body,—conditions absolutely requisite to its establishment,—subordinate conditions which influence the period of accession, the rapidity and duration of the putrefactive process,—concluding remarks on real and apparent death - Pages 62 to 98

CHAPTER III.

DROWNING.

Cause of death in drowning,—old hypotheses,—death owing to the non-renewal of air in the air-cells,—drowning a form of death by asphyxia. Time required for death to take place by drowning,—fabulous statements of

the older writers,—case of resuscitation by M. Bourgeois,—power of remaining submerged without loss of life,—attempts at resuscitation not to be speedily abandoned,—modern opinions respecting the period at which death ensues. Post-mortem appearances observed in the bodies of the drowned,—external appearances,—state of the thoracic viscera,—fluidity of the blood,—congestion of the cerebral vessels,—condition of the abdominal viscera. To determine whether death has taken place by drowning or not,—evidence from external appearances,—from the state of the internal organs,—from the presence of water in the stomach,—from its absence,—evidence from the existence of a mucous froth in the trachea,—of water in the lungs. Marks of violence on the bodies of the drowned. Wilkinson's case,—Carwardine's case,—Lumsden's case. Whether the drowning be the result of accident, suicide, or homicide? Martin's case,—case of Sarah Stout, 1699. Buoyancy of the human body in water, living or dead,—case of Admiral Carraccioli,—changes produced by putrefaction in water,—production of adipocere, Pages 99 to 158

CHAPTER IV.

HANGING. STRANGULATION. SUFFOCATION.

Hanging,—cause of death,—apoplexy or asphyxia?—Pressure produced by the cord on the nerves and blood vessels of the neck,—displacement and fracture of the cervical vertebræ,—rapidity with which death ensues,—cases of alleged resuscitation. Post-mortem appearances,—externally and internally. Whether the individual was hanged during life or after death?—evidence derived from the mark produced by the ligature,—signs of murder about the person. Whether the hanging resulted from accident, suicide or homicide?—cases of accidental hanging,—cases in which murder may be committed by hanging,—marks of violence on the body voluntarily or accidentally inflicted,—supposed evidence from the impression of the cord,—from laceration of the muscles and fracture of the vertebræ,—from the position in which the body is discovered,—examination of the evidence in the case of the late Duke de Bourbon. Strangulation,—post-mortem appearances,—whether death has resulted from strangulation or not?—cases of Sir E. Godfrey,—Sir J. Standsfield,—of Harris. Whether the strangulation was the result of accident, of suicide or of homicide?—remarks on accidental strangulation,—case of Beddingfield,—suicidal strangulation,—homicidal strangulation,—case of Dr. Clench. Suffocation,—causes of death by,—importance of medical evidence,—action of carbonic acid,—of the fumes of burning charcoal and

coal,—fatal cases,—death from the respiration of confined air. Black-hole of Calcutta,—the burning of a candle not always a criterion of safety,—sulphuretted hydrogen gas,—mephitic exhalations,—coal gas,—exhalations from the dead - - - - - Pages 159 to 215

CHAPTER V.

LIGHTNING. COLD. STARVATION. FIRE.

Death from *Lightning*,—on the conducting power of the human body,—effects of electricity by induction,—conducting power modified by the nature and height of objects,—by humidity. Wounds and other marks of violence on the bodies of those who have been killed by lightning,—cause of death,—post-mortem appearances,—state of the blood,—cadaverous rigidity,—putrefaction,—death by the returning stroke. Whether death has taken place by lightning or not,—case of Professor Richman,—accident at Châteauneuf-les-Moustiers,—recent cases. *Cold*,—cause of death from,—effects of severe cold on the vascular and nervous systems,—its effects on the function of respiration,—death from cold, accelerated by fatigue, exhaustion or habits of intoxication,—power of the body to resist cold,—post-mortem appearances,—decision from presumptive evidence. *Starvation*,—influence of age and sex on the power of abstinence—symptoms consequent on the absolute or relative privation of food,—period at which death ensues,—case of Engeltje Van der Vlies,—suicide by voluntary starvation,—cases of Viterbi and Granet,—post-mortem appearances,—value of medico-legal evidence founded on them,—starvation from diseased growths about the fauces,—homicide by starvation. *Fire*,—cases of murder by burning,—appearances assumed by severe burns, according to whether they have been inflicted during life or after death. *Human combustion*,—medico-legal question relating to,—case of Millet,—phenomena accompanying the combustion of the body,—case of Grace Pett,—contact with ignited bodies necessary. Spontaneous combustion of flax, cotton and charcoal,—important in relation to charges of arson - - - - - Pages 216 to 263

CHAPTER VI.

WOUNDS. PART I.

Caution in making an inspection of the body,—the whole of the body to

be inspected,—examination of a wound,—when inflicted,—nature of the instrument used,—notes made on the spot,—differences among witnesses on matters of fact. Mortal and dangerous wounds,—among several wounds, the necessity of determining which is mortal,—the intent of a prisoner punished when murder is attempted. Whether the wound was inflicted during life or after death?—signs of a wound inflicted during life. Hæmorrhage sometimes observed in wounds made after death,—sometimes not observed in wounds made during life,—characters of incised wounds made after death. Ecchymosis on the living,—changes peculiar to it,—a source of circumstantial evidence,—contusions on the recently dead,—coagula of blood,—evidence regarding fractures,—ecchymosis from infirmity or disease,—sugillation. Cadaverous ecchymosis. Vibices,—evidence in the case of Campbell,—of Carlo Ferrari. Detection of wounds long after death. Whether the wound was the cause of death or not?—causes of death not to be multiplied. I. Death an immediate consequence of a wound,—dying declarations. II. Death not an immediate consequence of a wound,—death from a wound after the lapse of twenty-five years,—different principles of the English and French Law. III. Death may follow a wound but not be caused by it,—cases,—death from co-existing disease,—from a wound inflicted subsequently to another wound,—from poison after the receipt of a wound,—cases - - Pages 264 to 314

CHAPTER VII.

WOUNDS. PART II.

IV. Death may be caused by a slight wound,—slight wounds rendered mortal by infirmity, disease, or the abnormal condition of parts,—responsibility of the aggressor. V. Death may result from neglect or improper treatment by the medical or other attendants,—responsibility of the aggressor. VI. Death may result from the improper conduct of the wounded party,—wounds rendered fatal by imprudence,—neglect to call in medical assistance,—refusal to submit to necessary operations. VII. Death may result from a secondary cause,—wounds rendered fatal by fever, erysipelas, tetanus,—result of a recent trial,—erysipelas occurring in a part remote from the seat of injury,—evidence in Mackenzie's case,—in Captain Moir's case. Death following operations required for the treatment of wounds,—death from phlebitis after venæsection,—Lawson's case,—remarks on the responsibility of the aggressor. Whether the wound was self-inflicted or not?—evidence from its situation,—nature,—extent and direction,—suicidal wounds of the throat,—case of the Earl of

Essex,—of *Sellis*,—remarks on the declaration of Sir E. Home,—evidence on the trial of *Macarthy*. The direction, important in sword and gun-shot wounds which traverse the body,—evidence on a recent trial at the Kent Assizes - - - - - Pages 315 to 365

CHAPTER VIII.

WOUNDS. PART III.

Circumstantial evidence in wounds,—detection of criminals by unexpected circumstantial proofs,—caution in drawing inferences. The number of wounds on a body,—the existence of two mortal wounds, no proof of homicide,—of several wounds, which was first received? Identification of spots of blood on weapons,—tests proposed, spots of lemon-juice mistaken for those of blood,—spots of rust,—blood on linen and other stuffs,—resemblance to madder-stains and iron-moulds. *Barruel's* process for distinguishing between human blood and that of animals,—objections,—medico-legal cases. Accidental origin of wounds, determined by circumstantial evidence. Wounds as they affect different parts of the body,—wounds of the head,—of the scalp. Extravasation of blood from blows,—case of *Ready* and *Mullaney*,—death ascribed to apoplexy,—*Fagent's* case,—*England's* case,—extravasation ascribed to excitement and intoxication,—*Swift's* case,—ingenious attempts of counsel to defeat medical evidence,—case by Sir C. Bell,—*McCormick's* case,—case related by Professor *Amos*,—death referred to apoplexy,—remarks on the medical evidence,—on the difference between the *medical* and *legal* probability of the cause of death,—evidence on a recent trial,—concussion distinguished from intoxication,—inflammation of the brain produced by concussion,—suppuration in the brain,—its connection with the blow,—death from concussion after two years,—recovery from severe wounds of the brain,—acts of volition after severe injuries. Can an injury to the head cause death without leaving any morbid changes?—case of the *sieur Charles Crès*,—general remarks. - - - - - Pages 366 to 429

CHAPTER IX.

WOUNDS. PART IV.

Wounds of the face,—penetrating wounds of the orbit,—gun-shot wounds of the mouth,—wounds of the neck,—punctured wounds of the

carotid arteries and jugular veins,—of the cervical nerves. Incised wounds of the neck,—of the trachea,—oesophagus,—arteries and veins,—possibility of performing acts of locomotion after such wounds,—evidence in the case of Danks. Wounds of the thorax,—of the lungs,—how rendered fatal. Wounds of the heart—not immediately fatal,—which cavities most commonly wounded,—volition and locomotion after severe wounds,—wounds and ruptures of the diaphragm,—question of survivorship after such wounds. Wounds of the abdomen,—contusions,—ruptures of the viscera,—penetrating wounds of the stomach and other organs. Legal relations of wounds,—provisions of the Lansdowne statute,—of the ancient law—to render an aggressor responsible, death must take place within a year and a day. Legal definition of a wound,—defects of the Ellenborough act,—can a wound within the statute be produced without a weapon? Opinions of the judges. Does oil of vitriol produce a wound?—decision of the judges in Murrow's case,—difference in the law as applied to England and Scotland. Are burns, scalds, fractures, dislocations, or internal lacerations, wounds within the meaning of the law?—surgical definition of a wound,—defects of the Lansdowne statute. Penal code of France,—enlarged signification of the word wound in the law of France compared with its restricted meaning in the law of England. Mayhem or maiming. What constitutes maiming in a medical and legal point of view? Inconsistent applications of the law. Remarks upon the legislation of the French regarding wounds - - - - Pages 430 to 502

APPENDIX.

On the form of an indictment for murder or manslaughter, by wounding, with the evidence required to support it - - - Pages 503 to 506

MEDICO-LEGAL QUESTIONS AND CASES.

Under what circumstances are notes or memoranda admitted in evidence?

Trial of Sir A. G. Kinloch. Edinburgh, 1795	- - -	Page 15
Trial of Wright. Norwich Ass. 1833: before Mr. Baron Bolland	-	16

What questions may a medical witness refuse to answer?

Evidence in a case tried at the Old Bailey Sessions, 1821	- -	19
---	-----	----

DROWNING.

Whether death had taken place from drowning or not?

Trial of Kennedy and Brown. Old Bailey Sessions, 4th Sept. 1832	133
Trial of Pugh, Williams and Mathews. Hereford Spring Ass. 1832	134
Trial of Hodgson. Durham Summer Ass. July 1834: before Lord Lyndhurst	- - - - - 140

Whether the drowning was the result of accident or homicide?

Trial of George Bayley. Stafford Summer Ass. 1832	- -	147
---	-----	-----

Whether the drowning was the result of suicide or homicide?

Trial of Spencer Cowper. Hertford Ass. 1699	- - - -	149
---	---------	-----

HANGING.

Whether the hanging was the result of suicide or homicide?

Case of the Duke de Bourbon: heard before the First Chamber of the Civil Tribunal of Paris, December 1831	- - - -	181
---	---------	-----

STRANGULATION.

Whether death was caused by strangulation or not?

Trial of Philip Standsfield. Edinburgh, 1688 - - - Page 190

Whether the strangulation was the result of accident or of homicide?

Case of Beddingfield, 1763 - - - - - 192

BURNS.

Whether burns had been produced during life or after death?

Trials of Gilchrist and another. Glasgow - - - - 248

WOUNDS.

Which wound (of several) caused death?

Case tried at Cen. Crim. Court, May 1835: before Mr. Justice Park 270

Whether the wound was inflicted during life or after death?

Trial of Burke and Macdougall. Edinburgh, December 1828 - 288

Trial of Bishop and Williams. Old Bailey Sessions, 1831 - - 291

Were the wounds the cause of death?

Nesbitt's case: tried before Lord Abinger. Northern Circuit,
August 1835 - - - - - 302

Trial of Richard Mevin. Northern Spring Circuit, 1833: before
Mr. Justice Alderson - - - - - 304

Chalk's case: tried before the Recorder at the Old Bailey Sessions,
May 1832 - - - - - 309

Sullivan's case: O. B. S. 1832 - - - - - 311

Was the violence sufficient to cause death?

Trial of Phillips. Croydon Ass. 1831: before Mr. Justice Gaselee 315

Trial of Dr. Fabricius. Old Bailey, 1721 - - - - 317

Did the wound or the improper treatment cause death?

Trial of Lamb. Old Bailey, 1759 - - - - Page 318

In death from a secondary cause, is the fatal event to be ascribed to the prisoner's act?

Trial of Robinson. Cent. Crim. Court, May 1835 - - - 328
 Trial of Pace. Justic. Court, Glasgow, 1822 - - - 329
 Trial of Mackenzie. Edinburgh, March 1827 - - - 332
 Trial of Captain Moir. Chelmsford, 1830 - - - 333
 Trial of Macmillan and Lawson. Edin. 1827 - - - 336

Was the wound self-inflicted or not?

Case of the Earl of Essex, July 1683 - - - - 346
 Case of Sellis, 1810 - - - - 349
 Trial of Macarthy. County Cork Crim. Court, April 1835 - 354
 Trial of Honey. West. Aut. Circ. Aug. 1835: before Mr. Justice
 Coleridge - - - - 356
 Inquest on the body of Ann Snow. London, April 1835 - - 357

Was the wound the result of accident or homicide?

Case recorded by Mr. Dunlop - - - - 361

Did the weapon or bullet penetrate the body in front or behind?

Case recorded by Dr. Smith - - - - 362

Which of several wounds on a dead body, was first received?

Case tried at the Norwich Assizes, 1830 - - - - 375

Was the extravasation of blood on the brain owing to a blow, to a fall, or to cerebral excitement?

Trial of Ready and Mullaney for manslaughter. Old Bailey Sess.
 Sept. 1833 - - - - 395

Was the extravasation of blood on the brain owing to violence, or to apoplexy produced by irritation and passion?

Trial of Mary and John Fagent for manslaughter. Home Circuit, Kingston, March 1835: before Mr. Justice Gaselee - - Page 399

Was the extravasation of blood on the brain owing to violence or to excitement?

Trial of England for manslaughter. Northern Circuit, Durham, Feb. 1833: before Mr. Baron Gurney - - - - - 400
 Trial of Swift. Western Circuit, Andover, July 1834: before Mr. Justice Patteson - - - - - 402
 Case recorded by Sir C. Bell - - - - - 406
 Trial of the McCormicks. Edinburgh, July 1831 - - - 407
 Case recorded by Professor Amos - - - - - 410
 Case tried at the Old Bailey, November 1834 - - - 414

Did the abscess in the brain result from a blow on the head or from disease?

Case recorded by Dr. Smith - - - - - 418

Is it possible that death may be caused by an injury to the head without leaving any observable morbid change?

Case of Charles Crès. Montpellier, 1833 - - - - - 423

Can an individual perform acts of volition and locomotion after a division of the great vessels of the neck?

Trial of John Danks for murder. Warwick Spring Circuit, 1832 439

Is death instantaneous in an extensive wound of the heart?

Case tried at Glasgow, 1819 - - - - - 452

Can an individual perform acts of volition and locomotion while labouring under a severe rupture of the diaphragm?

Case by M. Davat - - - - - 457

What degree of violence is capable of destroying the life of a pregnant female?

Trial of John Bond. Norfolk Circuit, Cambridge, 1835: before
 Lord Abinger - - - - - Page 464
 Case tried at Stafford, 1811 - - - - - ib.

What is the legal definition of a wound?

Case tried on the Lancaster Autumn Circuit, 1831: before
 Mr. Baron Vaughan - - - - - 481
 Trial of Ann Murrow. Liverpool, Aug. 1835: before C. J. Tindal 486

Can a wound within the Lansdowne Statute, be produced without a weapon?

Trial of Hough. Midland Circuit, Nottingham, 1832: before
 Mr. Baron Bayley - - - - - 484

ERRATA.

Page 42, line 18 from the bottom, *for cava read cavæ.*

153, 3 *for specific gravity of the human body in water, read
specific gravity of the human body.*

167, 8 *insert than before that.*

269, 7 from the top, *for result read results.*

296, 4 from the bottom, *for probable interment read probable period of interment.*

334, 18 *for of a responsibility read of the responsibility.*

454, 14 *for of portion read of a portion.*

INTRODUCTION.

General Observations on the Study of the Science of Medical Jurisprudence.—A Knowledge of its Principles important to Medical Practitioners, to Barristers, Judges, and Coroners.

It has been a just reproach to England, that, although she set the example to other nations of bringing to its present state of perfection, the system of "trial by jury," she has allowed them to take precedence in the cultivation of Medical Jurisprudence.¹ It was not until the beginning of the present century, that the attention of the government was directed to the importance of this subject; and a chair was soon afterwards endowed in the University of Edinburgh, in order that it might be publicly taught. So little, however, did this succeed in diffusing sufficient information, in this quarter of the island, on the nature and objects of the newly introduced science, that there were probably but few in the Medical profession, who were acquainted with the useful principles, which it inculcates, until the recent regulations, issued by the Apothecaries' company, drew general attention to the subject. Even now, there exists an indifference to the cultivation of this science among certain members of our profession, for which we can scarcely account, unless by supposing that they consider the ordinary routine of study, joined to the common experience of a professional life, sufficient to supply all the medico-legal information, which is likely to be required of the practitioner.

¹ L'Angleterre, qui, bien long-temps avant la révolution française, a donné au monde l'exemple de la publicité de la procédure et du jugement par jury, se trouve encore fort en arrière relativement à la médecine légale, et a été précédée par la France dans l'enseignement public de cette science et dans sa direction vers l'administration de la justice.—*Foderé Introd. à la Med. Leg.*

This indifference to the cultivation of the science, is not confined to those who look only to the acquirement of that portion of knowledge, which may suffice to carry them through a doubtful and uncertain career of practice; but it is tacitly maintained by some who are placed at the head of our profession, and to whose hands are entrusted its honour and dignity. In the regulations for study, issued by the Court of Examiners of the Royal College of Surgeons, Medical Jurisprudence is altogether omitted, from which we may fairly infer, that this science is regarded by the court, as useless to those who receive a surgical diploma. The only ground upon which the omission of this science in the curriculum of a surgical education, can be defended, is, that its relations to the duties of the practitioner, are not sufficiently known or appreciated. It does not appear to have been considered that Toxicology has any medico-legal applications which may call for the aid of the surgeon; although in proof of this, we need only appeal to daily experience. The numerous medico-legal questions, relating to wounds, and the different forms of violent death, to drowning, hanging, strangulation, and infanticide, we must presume to be unconnected, as subjects of practical investigation, with the duties of a surgeon;—yet it is a well known fact that surgeons are uniformly consulted in such cases: and their opinions are generally admitted to have a most important influence on the minds of a jury.

Medical Jurisprudence has been, for a long period, taught in the Colleges and Universities of the continent; but it is reserved for our College to offer the solitary example among enlightened nations of excluding from their prescribed course of education, a science which the growing wants of the community so loudly call for. It is, moreover, not a little singular that, in England, a knowledge of Botany should be deemed of higher importance to the surgeon, than a knowledge of Medical Jurisprudence; as if his duties lay rather in the discrimination of the peculiarities of plants than in the determination of questions relative to the life and death of his fellow creatures. This we must, however, really presume to be the case, if the course of education laid down

by the College, is to be taken as the standard of qualification for the surgeon. Without intending to throw the least imputation upon the labours of those eminent men, who are engaged in teaching the principles of Botany, it may, I think, be safely affirmed that no reasonable mind can hesitate to which subject it would assign the greatest importance and utility in practice. The inconsistency therefore, of enforcing the study of one branch of science, which is chiefly of an ornamental character, and but little available in a practical point of view, to the exclusion of another, which experience proves to be highly requisite to the practitioner, cannot be too strongly or too publicly condemned.

The author has been led to make these remarks upon the regulations of the Royal College of Surgeons, because the objects of Medical Jurisprudence are but little known to the present race of practitioners; and many individuals, especially those unconnected with the profession, might be disposed to found their opinions of its practical utility upon the nature of such regulations. That this view is erroneous, and that all, entering upon the practice of their profession, who neglect to acquire a knowledge of the science, incur a most serious responsibility, will, it is hoped, be fully proved by the cases quoted in the following pages. It cannot be denied that a course of medical education, in the present day, is one of severe discipline, or that the restrictions, which have been almost yearly imposed by our Corporate Institutions upon medical students, are now such as almost to dishearten a beginner; but in making these admissions, we ought not to forget that such additional labours, are almost indispensable in the present state of society; and, although they now appear arduous, they must ultimately have the effect of creating a superior class of practitioners. It would have been singular, indeed, if in the advance of every art and science, and in the progressive movement of society, Medicine alone should have remained stationary: and it would be a libel upon the good sense of the profession to suppose, that its members are unacquainted with the benefits which have already proceeded from the comparatively rigorous ordeal to which all who enter into it, are exposed.

Had Medical Jurisprudence been a science of longer standing, or were it even a little better known to the profession, it would not be necessary in this place to defend it on the ground of its utility, or to justify its admission into the series of medical studies. The objections, now urged against it, proceed from an ignorance of its principles on the part of the objectors ; for, assuredly, they, who have been in any way called upon to exercise a knowledge of these, have come away with the full conviction that they had treated with culpable neglect, a subject of the most serious importance. It is to be expected that the novelty, attached to the sudden introduction of a new branch of study, will call forth objections to its utility. In this respect, our science has only shared the fate of others. Indeed the imposition of any regulations in regard to medical education in the first instance, was treated as a serious innovation upon ancient practice, which was considered by the objectors, adequate to the wants of the public. Fortunately, the legislature decided otherwise, and, although there may be much to amend and improve in the present constitution of our Colleges, it cannot be denied that much good has already proceeded from their labours.

Medical Jurisprudence, as a branch of study, does not possess the attractions of Chemistry, nor does it appeal to the mind of the student with the same force, in a practical point of view, as Anatomy, Surgery, or Medicine. The occasions for the exercise of its principles, are not of such every day occurrence ; and therefore the advantages derivable from a knowledge of these, are apt to be neglected or overlooked. There are many medical men who leave the subject unnoticed, consoling themselves with the idea that they may pass through life without being called upon to give a medico-legal opinion in a Court of Law. This is undoubtedly the case with many, it may even be admitted with the majority of practitioners ; but if we inquire into the history of those who have been summoned before our legal authorities to explain or confirm the evidence against an accused party, we shall find from the nature of their testimony, if not from their own confession, that they were wholly unprepared for the questions put to them by counsel.

Is it then conscientiously speaking right, when no one can tell how soon his opinion may be required in questions of drowning, of wounds, of poisoning, of infanticide; or of numerous other subjects, involving the life of an accused party, to allow himself to remain unprepared for such questions, when the way is open to him by which he may prepare himself? Is it right, even in a worldly point of view, to sacrifice at the shrine of public opinion, a reputation which it may have taken many years to acquire, and the loss of which may be considered irretrievable; when a little additional exertion, at the season of study, would give him the power of avoiding a result which no reasonable man can contemplate without shuddering? But to shew the fallacy of such a mode of reasoning, as that which we are now combating, let us apply it to another branch of knowledge, which is considered more purely professional: I allude to Surgery. The minutiae of this science, are learnt by the student with the same degree of zeal, as if they were to be made the subjects of constant and daily practice in after life; yet it is a well known fact, that the practitioner may pass through a long life without being required to perform a single one of the numerous important operations, a knowledge of the details of which, he was so industrious in acquiring when a student. If, indeed, a man were to confine himself in his course of studies, simply to what he might be called upon to practise, whether it refer to Anatomy, Surgery, Chemistry, or Medical Jurisprudence, the extent of his labours would be much reduced; but at the same time the circle of his knowledge would be very limited. A question, however, would then naturally present itself, whether such an individual would be really fitted to undertake the practice of his profession, much less to enter into competition with others, who had had the wisdom to pursue an opposite course. Besides, it does not appear to be sufficiently considered by those who dwell upon chance and the possibility of their passing through a professional life without being called upon to act in a medico-legal capacity, that it is far more probable, as country practitioners, they, will be summoned to give evidence in Courts of Law,

than that they will be required to undertake any of these operations.

Let it not be imagined, that by these remarks I intend to discourage the student from acquiring a knowledge of the minutiae of operations, which in practice he may not be called upon to perform. His good sense will teach him, that he must not limit his studies to the lighter parts of his profession ; and if he aim at becoming a good practitioner, he will perceive the necessity of seeking information upon subjects which may appear to have only a scientific value. On the other hand, that a medical man cannot with security rely upon common chance to escape from medico-legal practice, will be seen by the examples cited in the sequel. It is true, he may or may not be called upon to appear in a Court of Law ; but when called upon, he will not always be able to throw the responsibility upon another ; and he will assuredly find that no excuse, on the ground of his want of preparation, will be admissible. He must submit to the severe cross-examination of a shrewd and experienced counsel, and, perhaps if the case be one of poisoning, by his defective evidence, he may be made the involuntary instrument of acquittal to a prisoner of whose guilt there may not be, morally speaking, a reasonable doubt.

From his ignorance of the obligations imposed upon him by the law, he may render himself indictable and punishable for a misdemeanour, or even for a felony. These are not imaginary cases ; instances will be hereafter given, in which medical men have so exposed themselves, and it is to be hoped, that these will serve as warnings to those who are commencing the study of their profession.

In the cultivation of this science, we have, moreover, a vast and interesting field of inquiry thrown open to us. In questions of drowning, hanging, and suffocation : in the influence of aerial poisons upon the system ; in the effects of lightning, cold, and other agents, are involved many points which would encourage us to the investigation of these subjects, if only from the interest which they are capable of affording to us. The application of the principles of Physiology, Chemistry, and Physics, to the elucidation of

the phenomena of these and other forms of violent death, will naturally render the subject attractive to the philosophical inquirer. Some may imagine that these collateral sciences, are too frequently introduced; but it may be well to state in this place, that the course of examination of a medical witness, is rarely confined to the mere facts connected with his professional experience. He is expected to possess both general and extensive knowledge; and he is very frequently required by the judge or counsel, to solve questions, a correct solution of which must depend solely upon the universality of his attainments. If his knowledge should fail upon these collateral points, and his ignorance become glaringly exposed, which is but too frequent a consequence, he must expect that the confidence of the Court will be shaken in regard to the opinions which he may have expressed upon other subjects, even where he has spoken without hesitation.

An acquaintance with this science will also lead the medical practitioner to a knowledge of the juridical institutions of his country, a knowledge, which combined with his own professional acquirements, cannot fail to render him an accomplished member of the community. It is the attainment of this station which should be the great object of his ambition. He should endeavour to uphold that character, which the Profession may be said to have acquired by the common consent of society. It is well known that there is no class of men, whose opinions are appealed to with such confidence on all subjects connected with natural science, as the members of the Medical profession. It ought, therefore, to be the aim of every individual who intends entering into it, to maintain that feeling of respect and deference in the public mind. The subjects to which the student is advised to direct his attention may appear to be too numerous, and of too varied a character, to allow him to keep pace with the general march of professional knowledge. But he would be wrong if he were to allow the dread of these difficulties to retard his progress. If he have but perseverance, he will find that these obstacles will become rapidly removed as he advances, for it is an undoubted

fact, that the discipline of the mental powers in one subject, serves to render them more acute, and to prepare the way for the ready acquisition of other stores of knowledge, which would have seemed in the first instance, unattainable. In the language of an accomplished writer, "we must not allow ourselves to be discouraged by the apparent disproportion between the results of single efforts, and the magnitude of the obstacles to be encountered. Nothing good or great is to be obtained without courage and industry; but courage and industry must have sunk in despair, and the world must have remained unornamented and unimproved, if men had nicely compared the effect of a single stroke of the chisel with the pyramid to be raised, or of a single impression of the spade with the mountain to be levelled."¹

That the cultivation of this science is really of importance both to the Public and Profession, will probably appear from the following considerations. To establish many capital felonies, as my readers must be aware, medical evidence is indispensable. I need only refer to the inquests and trials which are constantly taking place throughout the country on charges of murder, more particularly in cases of poisoning and infanticide; or on charges of manslaughter, which are so frequent on all our circuits. Now, in all these cases, the medical man who is the attendant of the deceased, or who may be by accident on the spot, is invariably summoned as a witness, without any previous inquiry being made respecting his knowledge or experience on the subject on which he will subsequently have to give evidence. He now, for the first time, regrets that he is unacquainted with Medical Jurisprudence, although, probably, but a few days before, he was one of those who felt secure under the conviction that he might pass through the whole of his life without being summoned into a Court of Law. He hastily collects together a few facts upon which he founds an opinion, which, on the trial, will probably either be set aside by the ingenuity of some counsel in cross-examination, or refuted by the experience of a brother practitioner. In

¹ Sharp's Essays.

the uncertainty attendant upon the conflicting testimony of the medical witnesses, and in the confusion produced by the mass of speculative opinions brought forward relative to the cause or manner of death of a deceased party, an acquittal must necessarily follow; and it is thus that many criminals, of whose guilt there can be but little moral doubt, are turned loose upon society. Now, if it be of importance to a civilized community, to establish laws to prevent the commission of such atrocious crimes, as those which have been enumerated, it is surely of equal importance to provide that these laws should be properly enforced, by securing competent witnesses. For it cannot be regarded in any other light than as a mere mockery of legislation, to prohibit the poisoning of another as a crime, and, at the same time, to neglect the only means by which such a crime can be clearly proved to have been committed. Within a very recent period, out of six trials for homicide by poisoning and cutting and maiming, which occurred in different parts of England, five ended in acquittals, because, as the judges observed in summing up the evidence, the opinions of the medical witnesses were of too speculative a character, and too conflicting with each other to justify the finding of a verdict of guilty. Such, then, is the opprobrium which attaches to our profession, and we must consider this opprobrium as well merited, so long as we neglect to lay in a proper stock of information on subjects of such vital interest to the community.

It is scarcely necessary in this place, to bring forward cases in support of these observations, as the details of such cases will be more particularly appropriate, to illustrate the different subjects to which they refer. The crime of *wilful poisoning* has been so much on the increase of late years, that it behoves every medical man in the progress of his studies, even if he neglect the other departments of the Science, to devote a certain portion of his time to acquiring a knowledge of the principles of Toxicology. By an attention to this, he will avoid exposing the life of any fellow creature to unnecessary risk, and will materially assist, when called upon, in upholding the authority of the law.

The most frequent cases, perhaps, in which a medical

man is required to give an opinion, refer to the death of individuals from *wounds* wilfully inflicted. It is scarcely possible to state the multiplicity of questions, of a medico-legal nature, which may arise out of this subject. If we refer to the reports of trials for manslaughter and murder, we shall see in what embarrassing positions a medical man is often placed, and this solely for the want of a little previous preparation. Two individuals, in a half intoxicated state, may quarrel; one of them may kill the other, and on an examination of the head of the deceased, a contusion will be found on the exterior, and an extravasation of blood in the interior of the skull. The medical witness may swear in his examination in chief, that the blow was the cause of death; but in cross-examination he may admit that the extravasation might have proceeded from increased cerebral excitement, independently of the blow,—an admission which will at once nullify the whole of his previous evidence, and, perhaps, cause the acquittal of the prisoner. It is uniformly forgotten that counsel, who have to defend these cases, constantly pursue a systematic course of examination, and generally succeed in obtaining verdicts of acquittal for their clients, by drawing contradictory statements from the mouths of the professional witnesses.

Let us now direct our attention to the crime of *infanticide*, trials for which are notoriously frequent, and to the establishment of which, medical evidence is indispensable. It may here be stated, that it is required by law, that the child must be proved to have respired, before a charge of murder can be sustained against the mother. There are many difficulties connected with the proofs required on these occasions, with which counsel are well acquainted, but which the medical witnesses are, generally speaking, wholly unable to meet. Hence it has been a subject of remark among experienced barristers, that there is nothing more easy than to overthrow medical testimony on these occasions. If any confirmation of the truth of this remark be required, we have only to refer to the reports of trials for this crime which have taken place on the circuits for many years past. In most of these cases the general evidence seems to have been complete; but the

charge has invariably fallen to the ground, because the medical witness has been unable to throw any light upon the question which is always raised by the Court,—whether the child was born living, or not. In all these instances, the examining counsel has been much better prepared than the witness, and has, therefore, generally succeeded in defeating his testimony. It is not my wish to be identified with those who are constantly crying out for the infliction of capital punishment, or who would desire to see a woman condemned for this crime upon unsatisfactory evidence; but it is assuredly a direct impediment to the course of justice to enact severe laws for the repression of crimes, and at the same time allow them to be violated by neglecting to adopt the most efficient means required for their enforcement. Our criminal code is sufficiently Draconic; and it is true, if convictions were more frequent in cases of infanticide, more victims would be brought to the scaffold; but this is a question for the legislator, and not for the medical jurist to determine. If by experience it be found that capital punishment is insufficient to check the progress of the crime, the law may be mitigated. But the practitioner should remember, that, in the capacity of a witness, he has a public duty to perform, to which his personal feelings must give way. The degree of punishment attached to a crime, should not be allowed to affect his testimony; and he would be decidedly culpable if he permitted, so far as his own evidence were concerned, any legal quibble to interfere with or obscure the truth. He is not responsible for the severity of the law: and therefore he should allow no appeal to his feelings as a private individual, to prevail over his conviction as a public witness.

The evidence of medical men on trials for infanticide, has been in most instances of a wavering and uncertain character. In the examination in chief, they have sworn that the proofs of the child having breathed after its birth, were sufficiently strong to enable them to assert that the child had lived; while on cross-examination, they have admitted the existence of fallacies connected with those proofs, which they acknowledged themselves to be unable to answer or refute. It is not difficult to trace out the source of this want of confidence,

shown by medical witnesses in their own observations. There is no one, doubtless, in the profession, who does not know that the employment of certain tests to determine the vitality of the child was most vehemently denounced by the late Dr. William Hunter.¹ In the time of this writer, the law relating to the crime of infanticide, was much more severe than it is in the present day ; and in this circumstance we may find some apology for the very partial and erroneous views which he has put forward on the subject.² They who have perused Dr. Hunter's treatise cannot have failed to perceive that the spirit by which the author was actuated, was rather that of humanity than the rigid investigation of truth. In every page do we meet with passages which appeal to our feelings rather than to our judgment ; in every sentiment do we meet with some observation in reference to the defects of the tests and proofs commonly resorted to, but which leave altogether unnoticed those instances in which they may be safely relied on. The cases of infanticide which he brings forward as illustrations, are stated in terms to excite our pity,—to make us forget the murderess in our compassion for the mother ; in short, in a manner altogether unbecoming a professedly physiological disquisition. If the principle of this writer had been that of doing away with the utility or value of all medical evidence in such cases, he could not have pursued a course better adapted for the accomplishment of this object. He has thrown out general objections to the employment of the hydrostatic test, many of which are more imaginary than real ; while others, which have the appearance of being founded in truth, are unsupported by experimental researches. Notwithstanding, however, the very superficial manner in which these objections are framed, they have sufficed to discourage all further investigations on the subject in the greater number of the profession, and to create in our

¹ On the Uncertainty of the Signs of Murder in Bastard Children.

² Stat. 21, Jac. 1, c. xxvii.—By this statute it was enacted, that if any woman, concealing the birth of a bastard child, were suspected of having murdered it, she was to suffer death as in other cases of murder, unless she could prove, by one witness at least, that it was born dead!

Courts of Law that species of scepticism, with regard to this branch of medical evidence, which strips it of all claim to admission.

It is unnecessary to dwell further upon this subject at the present time ; but it may be observed, that if the author of this treatise were now living, he would probably, from his acknowledged candour, be among the first to recant many of his opinions ; for we cannot suppose it to have been his intention that these should be made instrumental in bringing about the acquittal of the guilty.

In questions of poisoning, wounds, and infanticide, medical evidence must be regarded as still in a very defective state. The murderer may safely calculate upon his chances of escape ; and the public must suffer from the impunity with which such atrocious offences may be committed, so long as the members of the medical profession are content to treat with neglect, the principles of a Science, the professed object of which is to do away with the existence of such evils.

There are other cases, in which proofs of a crime may be so clear as to leave not the smallest doubt ; yet from being unacquainted with medical jurisprudence, the witness may neglect some vital point necessary to the legal completion of the evidence, by which the whole of his testimony will be rendered valueless. Let us take for illustration the evidence given in a case of poisoning. A medical man, after having examined the body of a person who has died from poison wilfully administered, may take home the contents of the deceased's stomach, in order that he may carefully analyse them. From some immediate occupation calling off his attention, the vessel in which they are contained may lie exposed on a table or in a closet for several days. Finally, when he proceeds to the analysis, he finds the clearest evidence of the existence of a mineral poison ; and he now supposes that he will be merely required, on the trial, to state the re-agents which he employed, and the result at which he has arrived. But the counsel for the prisoner, apprised of these circumstances, will object to the evidence of the medical witness, on the ground that sufficient care

had not been taken to establish the identity of the liquid analysed, with that taken from the body of the deceased. Such an objection would be fatal to the case, and unless other satisfactory evidence were adduced, the prisoner would probably be acquitted. The law requires, in a question of life and death, that there should not be the least ground for doubt or uncertainty; and the loose exposure of a liquid to the possible interference of others, upon the analysis of which so much depended, would be deemed in law fatal to its identity. The prisoner would assuredly have the benefit of the doubt which would be thus raised in the minds of a jury. So rigorous is the law upon this point, that where such a liquid should pass through the hands of eight or ten individuals, each must come forward and swear to its identity, —from whom he received it, to whom he delivered it, and under what circumstances it was placed while in his own possession. Points of this nature are but little known to the profession, and their importance is rarely discovered until too late to put in practice. In the section on poisoning by arsenic, a case will be given where the evidence of the medical witness respecting the analysis of the contents of the deceased's stomach was not received by the judge, because they had been left to the care of the casual attendants of the deceased.

Let me now call the attention of my readers to another important circumstance in the law of evidence, a neglect of which on the part of the professional witness is often prejudicial to the course of justice.

We will suppose that the practitioner is called upon to examine the body of a person who has perished by a violent death. Having made the inspection, and, if it be a case of poisoning, having satisfactorily conducted the analysis of the liquid found within the stomach, he trusts to his memory to preserve the details of his observations and experiments. Every point seems so perfectly clear to him at the time, that he thinks it unnecessary to make any remarks upon paper. Now if the crime be committed in a distant part of the country, the trial may not come on for six or seven months, and long before this period arrives, the practitioner

finds that his memory does not retain, so readily as he imagined it would, the facts of the case. He then, for the first time, commits his observations to paper, and on the trial produces this paper to assist his memory. To his surprise, perhaps he finds that he is not allowed by the Court to make use of these notes. He is obliged to trust to a confused recollection of the circumstances in giving his evidence, of which the counsel for the prisoner never fails to take the advantage.

It may here be remarked—although the subject will be more fully considered hereafter in treating of medical evidence,—that the law relative to the admissibility of notes or memoranda in evidence, is very strict, and is never allowed to be deviated from by our judges. To render such notes or memoranda admissible, it is indispensably necessary that they should be taken on the spot, at the time the observations are made, either by the surgeon, or under his immediate superintendence. If not taken at the time, or as soon after as practicable, no reference can be made to them; and the prisoner is allowed to have the benefit of a defective memory in the witness. Instances of this rejection of notes frequently take place. A memorable case occurred in Edinburgh many years since. On the trial of Sir A. Gordon Kinloch, for the murder of his brother, the medical witness was about to give his evidence respecting the wound of which the deceased died, from notes, made some time after the event, when he was stopped by the Lord Advocate, who explained to him the law on the subject. The reason why the law so rigorously excludes the admission of memoranda in evidence, made at a distance of time, appears to be this. It prevents the possibility of all fraud or collusion on the part of the witnesses, either to favour or to injure the prisoner; for a connected story might, it is presumed, by such means be so made up at a distance of time, as to defy the ingenuity of the counsel on either side to make out the deceit. There is another point connected with the admissibility of notes in evidence, in which the law appears to be unreasonably severe. This will be best explained by the recital of a case.

On a recent trial for poisoning, the medical witness, after having detailed the action of some re-agents which he had employed in the detection and identification of the poison, was about to refer to his notes before giving the results of his other experiments. Upon being asked when the notes were made, he answered satisfactorily by stating that they were taken at the time of the observations. The counsel for the prisoner then asked the witness whether he used the notes to refresh his memory, or whether he spoke only from what was written on the paper, without having any precise recollection on the subject. The witness, who did not appear in the least degree to suspect the object of such a question, stated that he spoke only from what he saw written on the paper, as his memory was rather defective. The counsel for the prisoner then objected to the witness's giving the results of these experiments, since he could only speak to the facts from the memorandum which he held in his hand. The counsel for the prosecution contended, that, as the memorandum was written at the time of making the observations, its contents were admissible as evidence. But the presiding judge, Baron Bollaund, ruled that the witness could not make use of the notes, because notes were available only to refresh the memory, and not to convey positive information relative to any subject altogether forgotten !

These circumstances relative to the law of evidence, cannot be too universally known ; for a man ignorant of them, whatever may be his professional knowledge and experience, becomes a mere cipher in the hands of counsel. The practice of taking notes in all medico-legal investigations should in every instance, even the most trivial, be followed by the medical practitioner. But let him bear in mind that, to render such notes useful, they must be made upon the spot, and to render them available in evidence, they can only be used to refresh the memory on the trial. The policy of this last restriction is not very apparent; but so long as it is law, a medical practitioner is bound to follow it.

¹ Trial of Wright, Norwich Assizes, 1833.

Many instances might be brought forward to shew that the public safety may become endangered by the negligence with which topics of a medico-legal nature, are treated by the profession. In speaking of the public safety, I refer to the effectual suppression and punishment of crime in which we are all, as members of civilized society, deeply concerned. It would be unjust to throw any imputation upon the present race of practitioners for a want of knowledge of this science, since at the time the great majority of them were learning their profession, the necessity for such knowledge was not perceived. In making this appeal, then, on the importance of the science on public grounds, I address myself rather to those who are engaged in their professional studies, than to those who are occupied in practice; although with regard to the latter, such a knowledge, if they had the time to devote to the study, would render their positions in society more secure, and would enable them, when called upon, to discharge their duties to the public, with greater conscientiousness and satisfaction to themselves.

It will now be proper to take a brief review of the situations in which a medical man, who neglects this study, may be placed as a private individual. It is scarcely necessary to refer again to the important questions on which he may be summoned to give an opinion; but it must be evident, that, if through his ignorance of the subject, a guilty person should escape conviction, or an innocent person be condemned, the witness must be prepared to submit to a loss of reputation and a loss of fortune. Is it not, then, the most prudent, not to say the most honourable course, that he should make this science a subject of serious study, before he launches into practice? A few hours occasionally devoted to this, in the season of youth, may be the means of saving him, in after-life, years of anxiety. It may be imagined by some that I am exaggerating the dangers which are likely to follow a want of knowledge of this science in practice; but if they who have had occasion to suffer from a public exposure of their ignorance in a Court of Law, were to come forward and state the truth, they would declare that these were no exaggerations.

A medical man is very frequently required to certify to the insanity of a party ; and some recent alterations in our statute law, have imposed certain restrictions upon the certificates given by him, with which it is absolutely necessary he should be acquainted, in order to avoid exposing himself to censure or punishment. Formerly these certificates were not unfrequently signed, without the patient being seen or examined. Now, however, by an act, passed during the reign of the late king, it is rendered imperative on the medical practitioner, that he should see and examine the alleged lunatic, within fourteen days previously to the signing of the certificate. Not long since, a surgeon was convicted in the court of King's Bench, under this act, of having certified to a case of supposed insanity, without having seen the party in the manner required by the law. There was something peculiar in this case. The lunacy certificate had already received the signatures of two surgeons, besides that of the defendant's partner. The defendant, therefore, thought that he was not exposing himself to any risk in attaching his own. The result of this case clearly shews how cautious we ought to be in taking the responsibility of another's judgment upon ourselves. The party against whom the certificate was issued, was proved to have been unjustly confined ; and the defendant was found guilty, and sentenced to pay a mitigated penalty. The defence set up was, that he was ignorant of the law ; but this ignorance was held to be culpable. The other surgeons who had certified, and whose signatures would have sufficed for all legal purposes, could not be prosecuted, as they had complied with the provisions of the act, and the error which they committed, was an error of judgment. This is only one instance out of many, in which a knowledge of medical jurisprudence may be of service to a practitioner. We will now take another, wherein a greater risk was incurred, and which might have proved of serious consequence to the party, but for the humane interference of the judge.

It is not, perhaps, commonly known to my medical readers, that all those individuals who take any share in a duel which proves fatal to one of the combatants, are accessaries to the

crime of murder in the eye of the law. Thus a surgeon, who should attend one of the parties professionally in such a case, would be deemed an accessory before the fact, on a charge of murder, and might, as such, be put upon his trial. It is also a well recognised principle in law, that a man is not bound to answer any questions which may subject him to a criminal prosecution, or to penal liability.

In the year 1821, a Mr. Scott was killed in a duel by a Mr. Christie. The second of the deceased was tried at the Old Bailey; and the professional man who attended Mr. Scott at the duel, was summoned as a witness for the prosecution. In the course of the examination, he was asked whether he could identify the prisoner. Now, it appears that the witness could have had no difficulty in swearing to the prisoner's identity; for he went in company with him to the duel. An answer in the affirmative would at once have criminated himself; for he could only have identified the second by acknowledging, that he himself was present at the duel—an acknowledgment which he was not obliged to make, and which might not only have led to the conviction of the prisoner, but have subjected the witness to a criminal prosecution. The judge, seeing that he was ignorant of the tendency which his answer might have to inculcate himself, warned him of the dangerous position in which he was placed. In consequence of this, the witness declined answering the question which had been put to him. Many judges might not have taken this trouble, but would have left it to the witness to raise any objections to questions put by counsel, presuming upon the witness's knowledge of the subject. Had it been so in this instance, the surgeon might have been exposed to an ignominious trial, and found guilty on his own confession.

Having thus fully considered the claims which this new science has, to be ranked among the branches of a medical education, we may next proceed to inquire, whether a knowledge of it may not be serviceable to other members of the community. It has been a general reproach to *Barristers*, that they, on their parts, have treated this science with an indifference which it certainly has not merited. On

attentively perusing the reports of trials for murder, it will be seen, in many instances, from the course of examination pursued by counsel, that if the witnesses were unprepared to answer, the counsel was, in many instances, but little fitted to understand whether the answers to his questions were correct or not. Had a more extensive knowledge of this science been shown by Barristers on our circuits, it is quite certain that medical evidence would have undergone a much more rapid improvement. An ill-informed practitioner would then have known, that in giving an opinion on a medico-legal subject, he was speaking to one who was capable of judging of its correctness. He would have been placed more upon his guard; and, if his evidence had been unsatisfactory, it would not, probably, have displayed that reckless character which medical evidence has but too frequently done, especially in questions of poisoning.

A medical man has often given a dogmatical opinion in a Court of Law, on a question put to him by counsel, which, on a more calm consideration at a subsequent period, he would have been willing to retract. It has probably passed without any remark, and has been allowed to have all the validity that a solemn opinion, solemnly given, could possibly have on the minds of a jury. It must, then, surely be admitted that, to a practising Barrister, a knowledge of Medical Jurisprudence is of essential importance, if not to conduct the examination of a witness in a regular manner, at least to prevent himself from being misled by the witness's answers. It is not to be expected that he should be thoroughly expert in medical practice and opinions, or that he should have the power of competing with a scientific medical witness on the witness's own ground; but he ought assuredly to be so far informed on the subject, as to be capable of comprehending the views of the witness, and of understanding how far they coincide with the doctrines and opinions of the most eminent authorities in the profession. On the trial of Eliza Ward, at the York assizes, 1816,¹ for the wilful administration of poison, the medical witness was

¹ Smith's Analysis of Medical Evidence, p. 211.

asked by the Court, what quantity of arsenic would be requisite to produce death: and he is reported to have said, that it would require "*one ounce and a half.*" On the trial of Nairne and Ogilvie, for murder by poisoning, which took place at Edinburgh some years since, the chief medical witness, a physician of Edinburgh, is represented to have said, in answer to a question, that arsenic "*would not dissolve in warm water.*"¹ At a still later period, on the trial of Ann Barber, for the murder of her husband, by poison, which took place at the York assizes, August, 1821, the following points were sworn to by the medical witness, and admitted without contradiction, as facts, by the court.² Arsenic gives "*a green precipitate,*" or rather "*a green colour,*" as stated by the witness, both with "*ammoniated copper*" and nitrate of silver. "*Blackness of the lungs and greenness of the stomach,* are criteria of mineral poisoning." Although, in the cross-examination of this witness, it was shewn, that his evidence was founded on very imperfect knowledge, yet not the smallest attempt appears to have been made by counsel, to prove his entire ignorance of the subject on which he was giving evidence.

In the case of Elizabeth Fenning, tried at the Old Bailey, April, 1815, for poisoning the Turner family, it was stated by the medical witness, in answer to questions put by counsel, that arsenic would produce the appearance of *blackness on a knife*, which has been employed to cut substances containing that poison. It was also alleged, that arsenic mixed with dough containing yeast, would prevent the mixture from rising by fermentation. These statements on the part of the witness, which, it may be observed, were subsequently proved unfounded by direct experiments, passed uncontradicted, and, of course, had their influence on the minds of the jury. In most, if not in all the instances quoted, the Barrister should have been in some degree prepared to expose the erroneous views propounded by the witnesses. It is too much to expect that a knowledge of the subject should exist only on the side of the witness,

¹ Smith's Analysis of Medical Evidence, p. 207.

² Ibid. 233.

yet this seems to be the principle which has hitherto been acted on by members of the Bar. If a witness have employed the terms "vascular," "comatose," "syncope," "asphyxia," "extravasation," in giving his evidence respecting the death of a deceased party, he has, on more than one occasion, been told to confine himself to the use of words of more intelligible meaning. Now it is scarcely possible that the medical practitioner can avoid using such professional terms, in some instances, and it is certain that his evidence would often lose a great deal of its force by their omission. The use of such words should, of course, be confined within proper limits; and no individual who thoroughly understood the subject on which he was speaking, would make an indiscriminate or improper use of them. The day for these displays of mistaken erudition has gone by; but at the same time it is not too much to expect, that Judges and Barristers should pay some deference to the use of terms sanctioned by the highest authorities in medicine, or that they should, at least, have some better plea to offer for their rejection, than their own ignorance of their meaning. This will be more particularly apparent from the consideration, that they who are concerned in the department of criminal jurisprudence, are so frequently required to hear, receive, and decide on the correctness of medical evidence.

Besides, there is something so strangely absurd in the principle, that counsel should be allowed to put a question to the medical witness, without being able to judge of the correctness of the answer made by the witness. When a medical practitioner is asked to state the tests for arsenic, or the precise mode of employing these tests for the detection of the poison, surely we are bound to expect that the examiner so far understands the nature of his own questions, as to know when they are incorrectly answered, even if he be not properly qualified to judge of the soundness of the witness's opinions. But so notoriously deficient are Barristers in general, in a knowledge of these points, that the most glaring inconsistencies in this department of medical evidence, may be often committed without the slightest chance of exposure. That questions are frequently put in medico-

legal investigations which may be answered at random by the witness, without any fear of immediate exposure, is an undoubted fact. The instances already quoted, prove clearly that this is the case; and it would not be difficult to bring forward evidence given on many more trials of recent occurrence, to shew that this practice still continues to a very great extent. To expect, therefore, that medical evidence should attain to any great degree of perfection, while the present loose manner in which witnesses are admitted to state their opinions in a Court of Justice continues, is in itself absurd. The expectation is but little likely to be realised, until some change be made, both in regard to the selection of witnesses and to the mode in which they are examined.

It must surely be conceded that a Barrister has a direct interest in the possession of such a knowledge of the subject, as will enable him to carry a doubtful case to a successful issue. It is not, moreover, strictly just that legal ingenuity should be spent solely in endeavouring to embarrass medical testimony, by making the witness appear to contradict himself,—a practice which is but too frequent in questions relative to death from wounds or to infanticide. It would be a far more noble field for the display of legal talent, if, instead of resorting to such unfair practices, the counsel were to direct his examination in such a way, that the ignorance of the witness, if he were really ignorant, should be exposed in a clear and decided manner, without the employment of embarrassing or ambiguous questions. By the present practice, many an individual, whose evidence, if it had been elicited by a proper and consistent train of questions, would have been of eminent service to a case, is made to appear ignorant, because the meaning of his answers becomes perverted by the ingenuity of his examiner; and this at a time when it is not easy for him to correct the impression produced on the minds of the Court. In the same way a shallow reasoner, who puts forward a speculative opinion with a boldness which defies contradiction, and probably upon a subject on which the examiner is but little informed, may impress the court with a high idea of his professional acquirements. These are not imaginary cases.

Let the reports of the criminal trials which have taken place within the present century, be referred to, and it will be seen, that, if justice has been in some instances impeded in its course by the ignorance of a medical witness, it has been equally impeded in others by the very improper mode of examination pursued by those who have been employed to undertake the prosecution or defence.

So little are Barristers acquainted with the subject of Toxicology, or with the general influence of poisons on the human system, that in their examination of a witness, they will sometimes pursue a course directly opposed to that which they should follow, in order to establish their case. Thus, instances have occurred where they have so far confounded the action of Narcotic and Irritant poisons on the system, as to expect that, in all questions of imputed poisoning, by a substance belonging to one or the other of the two classes mentioned, the appearances in the body after death would be similar. Now if, in a case of suspected poisoning, where the symptoms preceding death, indicated the decided action of a narcotic, and where the circumstances rendered it certain that the poison was of a narcotic nature, the counsel were to direct all his enquiries to the existence of appearances in the body, characteristic of the action of Irritant poisons only, the chain of evidence would be necessarily incomplete; and were the witness not to state openly to the Court, those points upon which the counsel ought to have examined him, the case might fall to the ground. The same observations are equally applicable to many other medico-legal questions; but it is too much the custom on these occasions to impute the cause of failure, especially in questions of poisoning, where an acquittal is obtained in opposition to a moral certainty of guilt, wholly to the medical witness, as if as much did not depend upon questions being properly put, as upon questions being correctly answered. In many cases, fortunately, the accompanying circumstances have been so clear in bringing home guilt to the accused party, as to lead to convictions in spite of imperfect questions and incorrect answers. For proofs of this statement, I would refer again

to the evidence elicited on the trials of Ward, of Nairne and Ogilvie, and of Barber, which will be more fully given in another part of the work. It is not in such cases as these, where the mere statement of the facts is sufficient to bring about the conviction of the party, that the skill of the examiner or the talent of the witness is best displayed. It is in those, where a doubt exists of the actual employment of poison,—where the medical evidence alone can establish the point, and where it rests with the Counsel to display that evidence in a clear and unequivocal light, so as to be intelligible to the minds of a jury. Is it to be admitted, that, in a case like this, the responsibility exists only on the side of the witness? Such an admission would be opposed to the fact, that every witness is but an instrument in the hands of his examiner; and so strictly is this privilege often insisted upon by the Bar, that a witness is but rarely allowed to deviate, in the slightest degree, in his answer, from the main subject involved in the question put to him by counsel. How much, therefore, must depend on such occasions upon a proper series of questions being put to the witness! That such cases but rarely occur, is fortunate, considering the very slight acquaintance which Barristers have with these subjects; but the possibility of their occurrence, clearly shows that they have no plea for the neglecting of a science which is capable, by assisting them on these intricate points, of improving the administration of our laws.

That a knowledge of Medical Jurisprudence is of importance to a *Judge*, cannot be disputed. The peculiar nature of the duties which this high legal functionary has to perform, renders it necessary that he should be fully qualified to comprehend the answers made by a well-informed medical witness, on all questions relating to criminal violence, or to the death of individuals. It has been by an acquaintance with this subject, derived from very long experience at the Bar, that many Judges have been enabled to perceive the discrepancies of medical evidence which had escaped the examining counsel, and have thus, in summing up, been able to inform the jury how far they might rely upon the opinions of the witness, and how far

these opinions agreed or disagreed with those of the great authorities of medicine. In the same way they have, by directing proper questions to the medical practitioner, often elicited more in a few answers, than an inexperienced Counsel has succeeded in doing throughout a long examination. Is not this then a privilege well worthy of possession ? And is it not in the possession of such a privilege by a Judge, that we have the strongest and most satisfactory pledge for the proper administration of the Criminal Law ?

Lastly, we may proceed to shew the very close relation which Medical Jurisprudence has to the duties of the *Coroner*. It is the peculiar province of this officer to investigate the cause of death, where the death of an individual is suspected to have arisen from violence ; and thus he is called upon to lay the foundation for all future legal proceedings against an accused party. How great, therefore, is the responsibility which attaches to the execution of so important a duty ! Much difference of opinion has existed in the professions of Law and Medicine respecting the qualifications requisite in the individual who fulfils the duties of a Coroner. - From the very strict connection which the investigations, carried on in a Coroner's Court, have with subjects of a purely medical nature, it has been supposed that a medical man was much better fitted for the office, by the nature of his profession, than a lawyer. It is generally admitted that a much more extensive knowledge of Medicine than of Law is required in these cases ; and it is not unreasonable to conclude, that the slight knowledge of the Law demanded, might soon be acquired by the medical practitioner. The only point essential to the public interest in this inquiry, is, to see that the duties of the Coronership be executed in the most efficient manner ; and, provided this be the case, it can matter but little to the members of either profession, which may be selected. In the present state of the medical Profession, and in the general neglect of Medical Jurisprudence by its members, it may be fairly questioned whether the interests of the public would be benefited by substituting medical men for lawyers. But that the present system of electing these officers is bad, and, that too little attention

is in general paid to the qualifications of the candidate, are facts which cannot be disputed. It has, however, been recently decided by our Legislature, that a knowledge of Medical Jurisprudence is unnecessary to the coroner, and that the time which he would have to devote to the study of the Science would interfere too much with his duties ! It cannot be denied that there are many intelligent men, now acting as Coroners, whose reading and experience have already provided them with sufficient knowledge of the subject, to enable them to discharge their duties in a most satisfactory manner,—to such it would be needless to apply compulsory provisions. But let us look to the great number of coroners dispersed over the country, whose conduct proves that they are, in many instances, wholly unfit for the office. Shall we say, in reference to these, that no provisions are necessary to ensure a proper preliminary education before they are permitted to undertake the duties of the office ? Is it a matter of indifference to the public that an individual should be incarcerated for six or seven months upon a groundless charge of murder,—become thus irreparably injured in his reputation, in his health, and perhaps in his fortune, owing to a want of medico-legal knowledge on the part of a coroner ? The error may be imputed to the medical witness ; but if the witness be ill-informed on the subjects on which he is questioned, it is surely a part of the coroner's duty to be able to discover this, and supply proper information to the jury. We might refer, if any reference were wanting to support these allegations, to the numerous charges of poisoning and infanticide which are dismissed on the circuits by our Judges, as groundless. In many of these, the accused parties have been confined for months upon evidence which a well-informed medical jurist would undoubtedly have rejected. It is not certainly intended that Coroners should usurp the duties of Judges, and decide on the spot, in a doubtful case, upon a question of poisoning or murder ; but, on the other hand, the Legislature ought to guard against the unnecessary incarceration of individuals, upon charges which a properly educated man would at once discover to be unsupported by the evidence.

It is not necessary, at the present time, to bring forward cases to shew the mischief which results from the present system of electing coroners. It is to be regretted that the candidate, on these occasions, has to depend chiefly upon his pecuniary resources and private influence, in order to obtain the office. No inquiry is made concerning his mental endowments; and he is left to acquire, by experience, that knowledge which ought to be the sole standard of qualification for his admission to the Coronership. To assert that such a standard of qualification is unnecessary because a coroner may always procure the assistance and advice of medical men, is to shift the whole of the responsibility in such cases from one profession to the other. The very indiscriminate manner in which medical witnesses are selected by these functionaries, is a perfect answer to such an assertion. It is well known that individuals, who scarcely belong to the profession,—who may have passed, perhaps, a year's apprenticeship with a chemist, are often required by the coroner to inform the jury, not on matters of fact merely, but on matters of opinion, relative to the operation of poisons on the living system. These opinions, thus loosely given, are received, and are often commented on, as if they had come from the most indisputable authority, and are left to influence the verdict of a jury. Can it be fairly contended, under the existence of such a system, that a coroner has a right to rely for his medical information solely on the witnesses whom he summons before him? If so, the mere accusation of a party will, in many cases, be sufficient to ensure his incarceration, how innocent soever he may be of the crime imputed to him, or how clearly soever that innocence may be established on the trial, by the more deliberate opinions of experienced men.

It might be, perhaps, deemed a work of supererogation to pursue this subject further. Enough has already been stated to shew, that Judges, Barristers, Coroners, and Medical Practitioners, are deeply interested in the cultivation of Medical Jurisprudence. It has been generally alleged, in works upon the Science, that these different members of the community ought, as a matter of duty, to make themselves

acquainted with its principles, as well as the application of these principles to practice. The author of this treatise has not been content with merely stating this as an opinion, but he has endeavoured to shew, by a reference to cases, that negligence on the part of the examiner or witness is culpable, and highly prejudicial to the interests of justice. How far he may have succeeded in this attempt, it will be for the reader to determine. In these introductory remarks, it has been his object to lay before the members of the two learned professions the consequences which must result from the continued neglect with which all medico-legal knowledge is treated; and he thought that there existed no better means of accomplishing this object, than the bringing forward of cases in support of his argument. In doing this, he has had to perform a somewhat ungrateful task; but he trusts, that the candid reader will perceive that his aim, throughout, has been to attack, not the individuals of either profession, but the defects of the systems, under which they are respectively educated.

SECTION I.

Questions relating to various forms of Sudden or Violent Death.

CHAPTER I.

ON ASPHYXIA.

Difference between Asphyxia and Syncope,—Causes of asphyxia,—phenomena of,—theory of Bichat,—of Legallois,—theory proposed by Dr. Kay,—examination of these theories.—State of the circulation in asphyxia,—objections to the views of Dr. Kay,—venous blood circulated.—Goodwyn's hypothesis respecting the action of venous blood on the heart,—proofs of the arrest of the circulation in the lungs,—post-mortem appearances in asphyxia,—influence of respiration on the pulmonary circulation,—assisting forces,—causes assigned by Bichat for the obstruction of the pulmonary circulation,—general conclusions.—Influence of venous blood on muscular contractility,—Dr. Edwards's experiments,—on the circulation of venous blood through the brain,—manner in which the cerebral functions are arrested,—difficulties attendant on the performance of experiments,—analogical inferences from experiments on animals.—General conclusions on the cause of death in asphyxia,—applications of a knowledge of this subject, in medico-legal investigations relative to drowning, hanging, strangulation, and suffocation.

PREVIOUSLY to entering into the Medico-Legal history of those forms of death, dependant on an interruption of the respiratory process, it will be necessary to offer a few remarks upon the subject of Asphyxia.

Asphyxia, a word derived from the Greek privative *a* and *σφύξη*, *pulsus*, literally signifies "loss of pulsation." It is that state of apparent death which is induced by any cause, preventing the action of the air on the blood during the process of respiration. Asphyxia was formerly considered to be synonymous with Syncope; but modern physiologists admit an important distinction between these states. In Syncope, the state of apparent death is induced by the entire cessation

of the circulation, owing to some violent impression on the heart; in Asphyxia, the circulation continues for a certain time, but the state of apparent death follows, because the blood circulated, is unfitted for the support of existence.

The causes of Asphyxia may be either of a *direct* or of an *indirect* nature. Asphyxia is *directly* induced by any of those causes which prevent the free passage of the air through the trachea. Thus, external constriction, as in hanging or strangulation,—the introduction of foreign bodies into the larynx or air tube,—the presence of diseased growths in those parts,—the submersion of the body,—or the respiration of gases unfitted to produce the requisite changes in the blood, may all be regarded as causes *directly* producing this condition of the system. We have an instance of the *indirect* production of asphyxia, in a paralysis of the muscles concerned in the act of respiration, which may be the consequence of injuries affecting the upper part of the medulla spinalis,—of a division of the pneumogastric or phrenic nerves,—or, lastly, of the operation of certain poisons.

When any of the common causes operate to produce asphyxia, there is speedily a loss of sense and motion; but life does not immediately cease. Previously to the accession of this state of insensibility and immobility, the animal struggles to liberate itself from the situation in which it is held during the experiment. These attempts evidently depend upon the exercise of volition; but, so soon as insensibility supervenes, the motions become irregular and convulsive, and are totally independent of the will. The heart still continues to contract; but its contractions are feeble, the circulation is languid, and the blood circulated, is of a dark colour. In this state of the system, organic action appears to be, in some degree, maintained; the animal heat is preserved; although, if the observations of Bichat are to be relied on, the processes of secretion and nutrition are arrested. If a stimulus be applied to the animal, or if the cause of asphyxia be removed before the spasmodic action of the voluntary muscles has entirely ceased, life may be restored; but it is doubtful whether any reasonable hope of resuscitation, can be entertained

when the whole of these motions have ceased. This is a question which will be more fully considered in the sequel.

Many theories have been brought forward to explain the phenomena which we have described, as attendant on the state of asphyxia. Among these, the theory of Bichat has been generally regarded as the most correct. This distinguished physiologist, in his "*Recherches Physiologiques sur la Vie et la Mort*," has detailed a series of ingenious and interesting experiments, from which he has drawn the conclusion, that the phenomena of asphyxia, are owing to the circulation of venous blood through the brain and the other organs of the body. He considers that, by the contact of this undecarbonized blood with the brain, a loss of nervous energy takes place, and, by the circulation of this blood through the muscular system, contractility is destroyed. The involuntary or convulsive motions, observed in asphyxia, he considers to be dependant on the impression produced on the nervous system by the contact of venous blood. It has been said, in allusion to this theory, that Bichat supposed that the heart, the muscles, the nervous system, and the other organs, were poisoned by the circulation of the venous blood in their structure.¹ But this does not appear to be a correct explanation of the views of the French physiologist.* The chief point advanced in his theory, is, that the disturbance of the functions in the state of asphyxia, is to be ascribed to the contact of venous blood with the organs; but he does not pretend to define the manner in which this

¹ Kay on Asphyxia.

* Bichat seems rather disposed to avoid entering into any hypothetical explanations respecting the action of the venous blood on the nervous system; for he says, in his *Recherches Physiologiques*, p. 373, " Nous pouvons donc assurer, que c'est réellement par la nature des principes qu'il contient, que le sang noir, ou est incapable d'exciter l'action cérébrale ou agit sur elle d'une manière délétère, car je ne puis dire si c'est négativement ou positivement que s'exerce son influence; tout ce que je sais, c'est que les fonctions du cerveau sont suspendues par elle." Again (p. 420), we find him drawing the following conclusion from his experiments: " Que lorsque les fonctions chimiques du poumon s'interrompent, tous les organes cessent simultanément leurs fonctions, par l'effet du contact du sang noir, quelle que soit la manière d'agir de ce sang, ce que je n'examine point."

blood operates. Another physiologist, M. Legallois, in a work entitled "*Recherches sur le Principe de la Vie*," considers that the cessation of the heart's action in asphyxia, is owing to the circulation of the venous blood through the substance of the spinal marrow.

A recent writer,¹ in treating of the subject, expresses himself dissatisfied with this theory of asphyxia; and he has proposed another, which he considers to be better adapted to explain the phenomena. According to this gentleman, asphyxia does not depend upon the circulation of venous blood, but rather upon the entire arrest of the circulation within the minute capillary vessels of the pulmonary cells. The most important part of this theory may be thus stated. When the atmospheric air is prevented from entering into the lungs, the blood is transmitted in an unarterialized state, to the left side of the heart. It is thence vigorously propelled onwards, through the whole of the ramifications of the arterial system. After a short time the quantity of blood received by the heart, diminishes,—the left ventricle gradually contracts, to adapt itself to the diminished quantity of the circulating fluid, until at length no blood will be found to escape on the division of an artery; and on examination, the ventricle will be found to have almost entirely obliterated its cavity. After this, blood slowly accumulates in the left auricle, from the large vessels of the lungs; and the contractility of this cavity, continues for a considerable period. The contractility of the right side of the heart is still longer maintained,—a circumstance attributed simply to the repletion of the venous system. Thus, the great mass of the blood, is forced into the veins on one side from the arterial system, and it regurgitates on the other from the pulmonary arteries to the right side of the heart, in consequence of the obstructed circulation through the lungs; the right auricle becomes distended by this powerful influx of blood, and this distension serves as a stimulus for its contractions, when the other cavities of the heart, not being so distended, have ceased to act.

¹ Dr. Kay.

So far this theory presents nothing peculiar : it is a plain statement of facts, and may be considered as sufficiently explanatory of the phenomena which accompany dissolution in asphyxia. It is in the cause assigned for the obstruction of the pulmonary circulation, that the author chiefly differs in his opinions from the views of Bichat and other physiologists. Dr. Kay¹ considers, that the pulmonary circulation continues only until the blood has removed from the residuary quantity of air in the lungs, the whole of its oxygen,—that the blood circulated, when the respiratory process is arrested, does not assume at once a venous character, but that it undergoes a gradual degeneration, becoming less and less arterialized, in proportion as the quantity of oxygen contained in the residuary air, is reduced. In order to account for the progressively and rapidly diminishing velocity of the circulating fluid, the author observes, that the minute vessels of all tissues, have peculiar sensibilities of organization, and he assumes “that the vessels of arterial blood in the lungs, are incapable of conveying blood in advanced stages of that venous degeneration which ensues, when the access of atmospheric air to the cells of the pulmonary structure, is precluded.” On the first accession of asphyxia, the blood passes through the venous capillaries of the lungs, because it becomes slightly arterialized by the oxygen still contained within the air cells. This arterIALIZATION of the asphyxial blood, is presumed to diminish as the oxygen is abstracted; and in proportion as it diminishes, the organic sensibility of the venous capillaries, is presumed to be exerted : it is thus excluded from those vessels, and regurgitates towards the right cavities of the heart. When the blood becomes decidedly venous,—that is to say, when it undergoes no further change on its transmission to the lungs,—it is incapable of exciting the organic sensibility of the venous capillaries or vessels of arterial blood, and the circulation altogether ceases. If, however, air be admitted before the circulation ceases, the usual changes take place in the blood, and the circulation

¹ Op. Cit. p. 178.

is resumed, because the organic sensibility of the venous capillaries, is again excited by the arterialized fluid.

In order to prove that the venous degeneration of the blood, takes place gradually in the state of asphyxia, Dr. Kay performed several experiments, the details of which it is unnecessary to enter into; but the results obtained may be briefly described.¹ When blood was allowed to issue from the wounded aorta of a rabbit, twenty-five seconds after the state of asphyxia had been brought on in the animal, it appeared to be of an arterial character, but "of a somewhat duller hue than usual." The aorta was opened in another rabbit, a minute and a half after the application of a ligature to the trachea; and the blood which issued had a slightly venous hue, but it retained still much of the arterial character. A similar experiment was made a minute and three quarters after the application of the ligature to the trachea; and the blood which issued was of a duller hue than that collected in the last experiment, but it was brighter than venous blood. In another instance, two minutes and a half were suffered to elapse, and the aortal blood was found to be darker; but it still differed from venous blood. At the end of three minutes, in another animal, the blood which escaped so closely resembled the venous blood, that Dr. Kay considered it as such. When three minutes and a half were suffered to elapse after tying the trachea, the blood generally ceased to flow from a divided artery; and it may be observed, that in each of the experiments above enumerated, the blood became smaller in quantity, in proportion as it became dark-coloured and lost its arterial character.

Such then are the facts upon which the theory of Dr. Kay is founded; and it will be seen that it differs from the theory of Bichat in many important points. The phenomena of asphyxia are ascribed in it to a stagnation of blood within the lungs,—this stagnation being occasioned by the venous blood not possessing the power of stimulating the organic sensibilities of the capillary vessels of arterial blood in those

¹ Op. Cit. p. 186 et seq.

organs. According to the generally received theory, the circulation in the lungs, is arrested in consequence of the nervous energy necessary to the functions of circulation and respiration being destroyed; and the destruction of this nervous energy, is ascribed to the transmission of a fluid through the great centre of the nervous system, which is unfitted to excite or stimulate the organ to the proper exercise of its functions.

In order to form a just estimate of the respective value of these theories, it will be necessary to enter a little more fully into a description of the phenomena, which are observed in asphyxia; and we will pursue the inquiry by endeavouring to determine:

1st.—The nature of the change which the blood, circulated in asphyxia, is stated to undergo.

2nd.—The probable influence of this fluid upon the organs of the body.

Most physiologists, in treating of asphyxia, have hitherto considered that the blood circulated after the stoppage of the process of respiration, has all the characters of venous blood. Bichat, in order to determine this point, applied a stop-cock to the trachea of a dog, and when he had it in his power to suspend or allow of the continuance of the respiratory process, he opened a small artery.¹ The blood which issued from the wounded vessel was of a dark colour when the stop-cock was closed; but it assumed the arterial character when the stop-cock was opened. In this experiment Bichat remarked, that the blood which issued from the artery was not, in the first instance, perfectly dark coloured. He admits that the blood only acquired the venous character by degrees. Hence it follows, that it is this imperfectly arterialized blood, which is circulated during the few minutes that the state of asphyxia lasts: and it is not, therefore, extraordinary that the blood which escaped from the wounded aorta, in the experiments of Dr. Kay, should appear to degenerate gradually from arterial to venous. At the time that the asphyxia is induced in the animal, there must be a certain quantity of blood contained within the arterial system, which, by mixing with that portion

¹ Bichat Rech. Phys. p. 324.

of the fluid which is transmitted unchanged from the capillaries of the pulmonary cells, may give to the whole, the dull arterial character described. If two or three minutes be suffered to elapse before the vessel is wounded, we may reasonably expect that the blood which escapes, should partake more of the venous character than it would, in the first instance ; since it is well known to physiologists, that arterial blood cannot remain long in contact with any of the tissues of the body, without acquiring the physical properties of venous blood. This appears to me to be a better explanation of the gradual change of character in the blood, than that which ascribes this change to the repeated abstraction of oxygen from the residual air contained in the pulmonary cells. It seems very doubtful, whether the blood in asphyxia possesses the power, ascribed to it by Dr. Kay, of removing all the oxygen from the air of the pulmonary cells,¹ before the circulation of blood ceases. In order to establish this, it ought to be most clearly shewn, that the air present in the lungs of animals which have died asphyxiated, contains no oxygen. M. Berger's² experiments do not appear to me to warrant this inference ; for they extend only to the analysis of the air which escaped from the lungs of animals on the first accession of asphyxia by submersion. These experiments were, moreover, performed at a time when the analysis of mixed gases was not so perfect as it is in the present day.

It is not, therefore, proved that the venous blood, circulated in asphyxia, undergoes any other change than that which it would undergo by mixing with the blood contained in the arterial system, at the moment in which the asphyxia commences ; the mere fact of its having a less arterialized appearance, in proportion to the period suffered to elapse before it escapes from a wounded artery, after the accession of asphyxia, is insufficient to demonstrate that it acquires this appearance at the expense of the oxygen of the air contained within the pulmonary cells. At least, to render this explanation at all applicable to the case, a very

p. 178.

² Essai Physiologique sur la Cause d'Asphyxie par submersion.

careful analysis of the air contained within the lungs of asphyxiated animals, should be instituted; and when we consider that, under common circumstances, an animal will perish by asphyxia in an atmosphere containing oxygen, before it has abstracted the whole of the oxygen, we may presume that the lungs will not effect more upon the air, contained within the air cells, than they would, when the individual was confined within a given volume of atmospheric air. In the absence of experiments upon the subject, we may be permitted to draw this presumption; it is open to be disproved by future experimental researches.

Another part of the new theory of asphyxia which requires consideration, is the following. It is contended that the minute vessels, of all structures, have peculiar sensibilities of organization; and that this organic sensibility of the pulmonary capillaries, is such as to cause the vessels of arterial blood in the lungs, to offer a mechanical resistance to the passage of the venous fluid.¹ If this point could be clearly established, it would be unnecessary to argue further upon the nature of the blood circulated in asphyxia; for it would follow, as a matter of course, that the venous capillaries of the lungs would never transmit blood until it had undergone some degree of arterialization. But, in the present state of our knowledge, we are scarcely justified in drawing any inference of the kind, since we know but little concerning the organic sensibility of parts: and it is impossible for us to determine, by any *a-priori* reasoning, what power this organic sensibility is capable of conferring upon any tissue. It may possibly differ in the two sets of pulmonary capillaries; but some stronger proof than the mere difference in the properties of the blood contained within these vessels, ought to be adduced to establish this. It was formerly imagined by Goodwyn, that the membrane, lining the two sides of the heart, was endowed with an organic sensibility peculiar to each side; and this physiologist further attributed the death of an asphyxiated animal to the want of stimulus in the venous blood, to excite the left cavities of that organ to con-

¹ Kay, p. 124.

traction : but it has been clearly proved, by Bichat, that this was a groundless assumption. It is now well established, that the left side of the heart, will circulate dark blood for a certain period ; and the only stimulus necessary for the propulsion of this fluid, appears to be a simple repletion of the cavities of the organ. The alteration in the properties of the blood does not arrest its circulation by affecting the organic sensibility of the membrane lining the left auricle and ventricle, as Goodwyn supposed ; and there seems to be no good reason for believing, why, if the heart can circulate both florid and dark blood, the other parts of the vascular system should not have the power of transmitting these two kinds of blood through their respective organs : at least, it is not by attributing to the capillary vessels of these organs, the possession of an assumed faculty or power, that we should be led to entertain a contrary opinion.

Some experiments instituted by Dr. Kay, in order to disprove Bichat's statements concerning the influence of venous blood upon muscular contractility, appear to shew that such an organic sensibility as that alleged, does not exist in the capillaries of arterial blood.¹ In one of these experiments, dark blood was taken from the vena cava of one animal, and injected into the aorta of another, after the muscles of the lower extremities in the latter, had lost all power of contraction on the application of the galvanic stimulus. The left iliac artery in this animal, was secured by a ligature, consequently the venous blood was chiefly transmitted to the right extremity. The contractile power of the right leg, in which the artery was pervious, immediately became strong, while that of the left limb, in which the iliac artery was tied, remained extinct.² A second and a third quantity of blood, collected from the divided vena cava, were injected; and it is stated, that vivid contractions ensued on the application of the stimulus to the right limb, and continued, though with decreasing force, an hour. These experiments were repeated, with similar results; and the conclusion drawn from them by the experimentalist is, that the dark blood does

¹ Kay, p. 150, et seq.

² Kay, p. 151.

not exert any noxious influence upon the contractility of the voluntary muscles.

We must surely conceive that, in these experiments, the venous blood was circulated through the arterial capillaries; or, otherwise, it would be impossible to explain how it should operate in restoring the contractility of the muscular fibre. If this be granted, it is impossible to admit, with Dr. Kay,¹ that the innervation, or organic sensibilities of the minute vessels, which circulate the arterial blood, must be different from those which convey the venous. The results of his own experiments, appear to me to oppose directly such an admission; and, unless some facts be adduced to shew that the properties of the capillaries in the lungs, differ from those possessed by the capillaries of other parts of the system, we must conclude that the arrest of the capillary circulation in those organs, during the state of asphyxia, cannot, with any physiological truth, be ascribed to the rejection of the dark blood, as an effect of a peculiar organic sensibility, assumed to be possessed by the capillaries of arterial blood.

From the effects of certain gases, when introduced into the lungs by the process of respiration, we may also derive facts, which appear to be inexplicable upon the doctrine laid down in this theory. If, for instance, the sulphuretted hydrogen gas be respired, it appears to be absorbed by the blood, and to become circulated throughout the whole of the arterial system. That it produces a change of colour in this fluid, is a proof that it is absorbed; and that a piece of silver will become tarnished when introduced into the substance of a muscle, is a proof that the gas is freely circulated throughout the body. Here, then, we find, that blood charged with sulphuretted hydrogen gas, not only unarterialized, but absolutely poisonous, may pass through the pulmonary capillaries of arterial blood. Again, if, instead of sulphuretted hydrogen gas, we cause an animal to respire the carbonic acid gas, the circulation does not appear to become suddenly arrested, but the blood is transmitted to the heart in an

¹ Op. Cit. p. 124.

unarterialized state. It is not here the place to discuss the question whether the carbonic acid gas, in producing death, does penetrate into the pulmonary cells or not: it will be sufficient to state, that, according to the results obtained by recent experimentalists, it acts by a positive influence on the system: and it is therefore probable, that in the respiration of this gas, the blood circulated, possesses something more than the general characters of venous blood. If, then, it be satisfactorily shewn, that blood, charged with sulphuretted hydrogen or carbonic acid gas, may traverse the pulmonary capillaries of arterial blood, it is fair to presume that no resistance will be offered by these vessels to the passage of venous blood. At least, some good reason should be brought forward to shew why the organic sensibility, which is presumed to obstruct the passage of the venous fluid, should not also operate to exclude the blood whenever it is in an unarterialized state.

For these reasons, it does not appear to me that we can truly assign the cause for the stoppage of the pulmonary circulation to the exertion of any organic influence by the capillary vessels. That the arrest of the circulation does take place within the lungs is certain; for the post-mortem appearances met with in the bodies of those who have perished by asphyxia, establish this beyond all controversy. The arterial system is empty; but the capillary vessels are every where penetrated by dark-coloured blood; the venous system is generally full; and the superior and inferior cava, where they empty themselves into the right auricle of the heart, are, generally speaking, gorged with blood. The right auricle and ventricle are also fully distended. The lungs are gorged, and the pulmonary vessels, especially the ramifications of the pulmonary artery, are commonly distended by venous blood. The left auricle and the pulmonary veins, are found to contain a large quantity of blood of a venous character; but the left ventricle is generally contracted and empty; or, if it contain any, it possesses none of the arterial characters. The more slowly the asphyxia has taken place, the more strikingly will these appearances be developed.

The engorgement of the right side of the heart and of the venous system, proves that the blood could not find its way through the pulmonary vessels; and, in attempting to assign a reason for this obstructed state of the pulmonary circulation, we arrive at a question which has given birth to many physiological speculations, namely:—how, and in what way, does the process of respiration assist the circulation of blood through the lungs. It is needless to observe, that, for the understanding of the phenomena of asphyxia, an answer to this question is not absolutely indispensable. It is even probable, that, if we could obtain a perfectly satisfactory solution of it, it would render us no practical assistance in the treatment of the asphyxiated—it would place us in no better position, than that in which we are at present. Bearing this in mind, I see no reason why we should hesitate to adopt an opinion, respecting the influence of respiration on the circulation of the blood through the lungs, which is somewhat old in physiology. I allude to that opinion by which the respiratory act, is considered to have a mechanical influence on the transmission of the blood through the pulmonary capillaries. We may conceive, that, by the perfect distension of the air cells, the blood finds a much more ready passage through the minute vessels, ramifying upon the parietes of these cells, than it does when they are collapsed, and almost destitute of air. When, therefore, the act of respiration is arrested, and the state of asphyxia is induced, we may, perhaps, without impropriety, ascribe the regurgitation of blood which takes place, and the consequent distension of the pulmonary artery and right cavities of the heart, to the mechanical impediment offered, on the non-admission of air, by the minute pulmonary vessels, which the very feeble action of the right cavities of the heart is unable to overcome. This was the opinion of the illustrious Haller, and it has been maintained by many physiologists since his time. The question, although not of much practical importance, or necessary to the understanding of the phenomena of asphyxia, is of great physiological interest; and therefore it will be proper to devote a little attention to the arguments which have been adduced on either side.

That the act of respiration, is essential to the due passage of the blood from the pulmonary artery into the pulmonary veins, is proved, by the very curious adaptation of the circulating organs in the foetus, to the different course which the blood takes, before and after the establishment of the respiratory process. An extensive pulmonary circulation, during the state of foetal existence, would answer no purpose in the economy: the blood, therefore, which, in after-life, is destined to be transmitted through the ramifications of the pulmonary artery, finds its way into the left cavities of the heart by the foramen ovale; and into the aortic system by the ductus arteriosus, which, before respiration, may be almost regarded as a continuation of the pulmonary artery. The branches of this vessel, which supply the lungs, are extremely small, and are fitted to convey but a very inconsiderable portion of blood to the organs. When we examine the phenomena, attendant on the process of respiration in after-life, we can hardly fail to draw the conclusion, that a free distension of the bronchial cells, must have an influence upon the passage of the blood through the minute vessels of the lungs; that, in inspiration, the passage of the blood must be facilitated, while, in expiration, it must be retarded.¹ This influence we must regard as being purely of a mechanical nature, and totally independent of any other influence which physiologists may, from the insufficiency of this explanation in all cases, consider it necessary to attribute to the respiratory process. That there are other causes which facilitate the passage of the blood through the pulmonary structure, cannot be disputed. One of these causes, we may find in the contraction of the right ventricle; and this alone, in the opinion of our countryman, Harvey, was adequate to solve the physiological problem. The influence of the right ventricle, in propelling onwards the contents of the extremely minute capillaries of the lungs, has been denied; but there is little reason to doubt, that here, as well as in the general circulation, the vis-a-tergo must operate to a certain extent,

¹ Magendie, *Précis Elémentaire de Physiologie*, Tome ii. p. 376.

Richerand, *Elements of Physiology*, p. 226.

the vascular system being constantly full. The passage of the blood through the pulmonary artery and its branches, is also facilitated by the operation of a well-known principle in hydraulics. The capacity of the minute branches is far greater than the capacity of the pulmonary artery; consequently the blood is continually flowing from a smaller to a larger space. By this, its passage is facilitated, but the velocity of the current, is at the same time diminished. Again, a peculiar action has been ascribed to the capillary vessels themselves, by which they are presumed to have the power of propelling their contents onwards. This action has been ascribed to the capillaries, rather from the supposed insufficiency of the other causes to account for the pulmonary circulation, than from actual observation or experiment. It is altogether denied by some physiologists,¹ chiefly because the motion of these vessels in the lungs, has not been made evident to the eye, on the application of the microscope. But, notwithstanding the objections offered to the existence of this contractile power, it is generally regarded, as one of the auxiliary forces of the pulmonary circulation. Lastly, an influence has been attributed to the pneumogastric nerves, which is presumed to be capable of modifying the action of the capillaries.

Now, when we speak of the obstruction to the passage of the blood through the lungs, in the state of asphyxia, as arising from the cessation of the respiratory process, and the enfeebled action of the right cavities of the heart, it is not pretended that these are the only causes of the disturbance of the pulmonary circulation; for this would be equivalent to excluding altogether, the influence of the nervous system over the capillary vessels. It may suffice to state that these are the two most apparent circumstances to which the arrest of the circulation can be ascribed; and so much do some physiologists attribute to the action of the heart, that it has been contended, if this organ had the same power to propel the blood in the state of asphyxia that it has, in the healthy living subject, the congestion in

¹ Magendie, Op. Cit., Tome ii. p. 374.

the pulmonary capillaries might be overcome, and the circulation still continue. In admitting that the capillary vessels are subjected to the influence of the nervous system, it is necessary to observe, that the present state of our knowledge, does not allow us to define the nature of this influence or to limit its operation. When we speak, therefore, of the organic sensibility of these minute vessels, we are venturing into the region of conjecture; and we imagine that we are assigning a very satisfactory cause for the sudden arrest of their action, when we are merely adopting a more circumlocutory form of expressing our entire ignorance of the subject. If these observations, relative to the obstruction in the pulmonary circulation, be admitted as correct, we must consider that the act of respiration, does not cease in consequence of the congestion of blood in the pulmonary vessels, but that the latter condition, is rather the consequence of the former.

Bichat, whose opinions upon these physiological questions, have been generally treated with great attention, contends that the influence of the respiratory process on the circulation through the lungs, is not of a mechanical nature.¹ He argues, that the collapsed state of the bronchial cells can present no real obstacle to the passage of the blood,—a position which, he considers, he has clearly established by his experiments. He remarks, that the vessels which supply the stomach and intestines, do not have the passage of the blood retarded or accelerated in them, according to whether these viscera be collapsed or distended. In order to supply evidence by experiment, he states that he divided the trachea of a dog, and fixed to the lower divided portion of the tube, a syringe, by which he might at once draw out the air contained within the bronchial cells. Having thus prepared the animal, he concluded, that upon producing exhaustion by the instrument, no blood would flow from a divided artery; because the perfect collapse which would ensue in the lungs, would, he presumed, suffice to impede altogether the flow of blood from the pulmonary artery to

¹ Recherches Physiologiques, p. 310

the pulmonary veins. On dividing the carotid artery, however, under these circumstances, it is stated, that the blood continued for some time to issue in jets from the open vessel, proving that the circulation still continued, notwithstanding the fact that the lungs were destitute of air, and that the process of respiration could, in this case, have no influence on the transmission of the blood. This experiment, which might at first sight appear conclusive in its result, can only be regarded as affecting that theory, which, setting aside the influence of all other agents, assumes, that the distension of the lungs with air, is the sole cause of the free passage of the blood in the pulmonary circulation,—an assumption so unfounded, that it could not be for a moment entertained.

Bichat considers, that the obstruction to the circulation in the lungs, may depend : *Firstly*, upon the blood ; *Secondly*, upon the lungs ; *Thirdly*, upon the heart.¹ In relation to the blood, he states, that a much larger quantity passes from the arteries into the veins, than in a healthy condition of the system ; because no blood is expended in secretion and nutrition, while the individual is in a state of asphyxia. To this circumstance, also, he ascribes the large quantity of blood found in the venous system of the asphyxiated. In relation to the lungs, he infers that the stagnation arises in consequence of these organs not being stimulated by the dark venous blood which now penetrates them. In relation to the heart, he observes, that the enfeebled state of the right cavities, will sufficiently explain how this organ is concerned in the arrest of the pulmonary circulation. The enfeebled state of this organ, according to his theory, is dependant on the circulation of the unarterialized blood through its substance, a subject which we shall presently have occasion to examine at length. The two first causes, assigned by Bichat, appear inadequate to explain the phenomena of the obstructed circulation. The last cause, namely, the feeble action of the muscular parietes of the heart, has been already treated of : and it is probably in this, joined to the collapsed state of the lungs, that we have the most satisfactory explanation of the

¹ Op. Cit. p. 340.

appearances observed in those organs, where death has been occasioned by asphyxia. In pursuing the enquiry beyond this point, we shall have to consider, how it is that the respiratory process is arrested, and the action of the heart enfeebled, when any cause operates to produce this state.

From these observations, relative to the circulation and the nature of the fluid circulated in asphyxia, we may be permitted to draw the following conclusions :

1. After the commencement of the asphyxia, or the state of apparent death, the circulation will continue for a period of time varying from three to four minutes. The circulation is not arrested at once ; but it takes place slowly, the quantity of blood received by the heart, and the quantity transmitted through the lungs, gradually diminishing, until at length that portion received by the left auricle, is not propelled into the left ventricle ; and the blood received into the right cavities, cannot be forced into the lungs.

2. The blood which is circulated in the state of asphyxia, partakes more or less of the venous character ; and if it be at all arterialized, this change is to be ascribed to its admixture with the florid blood, existing in the arterial system at the time that the asphyxia is induced ; and not to its decarbonization by the residuary air contained within the air cells of the lungs.¹

¹ In making this statement, relative to the unarterialized character of the blood in asphyxia, I must refer the reader to page 38, where the question has been already discussed. From several experiments, instituted on animals which have been asphyxiated by suspension, I have been led to consider that the apparently arterial character which the blood possesses, when it issues from a wound made in an artery about a minute or two after the occurrence of asphyxia, is due, not to any aeration which it experiences from the residuary air of the pulmonary cells, but to the mere circumstance of its becoming mixed with that portion of arterial blood, previously contained within the wounded vessel. It is not impossible that the blood in asphyxia may, in the first instance, become in some degree acted on by the residuary air of the bronchial cells ; but when it is stated that this action continues until the whole of the oxygen is removed and absorbed by the blood, the statement appears to me so improbable, that, unless it be well supported by very careful analyses of the air, contained in the lungs of asphyxiated animals, I must altogether reject it.

Having then fully entered into an examination of the *first* proposition, namely, concerning the state of the blood and the circulation in asphyxia, we will now proceed to examine the *second*, (page 37), in which we have to determine the probable influence of the fluid, thus circulated, upon the organs of the body.

Bichat having discovered, that, contrary to the hypothesis of Goodwyn, the venous blood was capable of stimulating the left cavities of the heart; and having, by his own experiments, determined that it was circulated through the body on the accession of the state of apparent death, was led to infer, that it arrested the vital functions by its contact with the muscular and nervous systems, and with all the organs of the body. The action of the heart, he conceived to become primarily suspended by the circulation of the undecarbonized blood through its substance: and so powerful does he consider the impression thus produced to be, that he hypothetically states, if it were possible to propel the venous blood through the coronary arteries, while, at the same time, the arterial fluid was transmitted, as usual, through the left cavities of the organ, the circulation would become as speedily suspended, as in asphyxia, where the venous blood only reaches the tissue of the heart, after having traversed the left auricle and ventricle. Whether the venous blood, thus circulated through the muscular structure, operates, when it reaches the capillary system, on the fibres themselves, or upon the nerves which supply these fibres, he does not pretend to define; but he inclines to the latter opinion, that is to say, he regards the destruction of muscular contractility in asphyxia, as a result of the action of the venous blood, generally, upon the nerves which are distributed over the ramifications of the arterial system. It may be inquired, observes this physiologist, in what way the venous blood acts upon the nervous or muscular fibre. "Does it directly destroy the functions of these parts, in consequence of the principles which it abundantly contains, or are we to ascribe its influence to the absence of those materials which enter into the composition of the arterial fluid?" In endeavouring to furnish answers to these questions, we

should have to determine, whether oxygen is to be regarded as the principle of irritability, as also whether hydrogen and carbon have a sedative influence or not." But he very philosophically remarks, that we should be satisfied, when we arrive at the limits of strict observation,—at a point where the light of experience can no longer assist us. Conformably to these principles, he is willing to conclude, without determining the precise mode of its operation, that the venous blood arrests the functions of the heart, from its being unfitted to act as a proper stimulus to the irritability of the fibres of that organ.

This is one of those parts of Bichat's theory, which, it may be observed, is not supported by direct experiment. It is merely inferred by analogy, that the venous blood is an insufficient stimulus to excite the contractile powers of the organ. If, observes Bichat, it can be established, that the venous blood suspends or enfeebles the action of the muscular fibre in one part, we have a right to presume, that the same influence is extended over every muscle, whether it belong to the voluntary or involuntary class. In order to shew that the venous blood suspended the functions of the voluntary muscles, he injected a quantity of this fluid into the femoral artery of an animal, and he found, that the motion of the limb was first destroyed, and lastly, the sensibility. In this experiment, it was absolutely necessary that the artery should be secured by a ligature above the orifice of injection; and it has been very properly objected to the inference drawn from the result, that the simple application of a ligature to the artery, would produce similar symptoms. Bichat was aware of this objection, and endeavoured to answer it; but his answer is far from producing conviction. This part of the theory has been closely examined by Dr. Kay;¹ and the opinion of Bichat, so far as regards a positive influence from the contact of the venous blood with the muscles, is very satisfactorily disproved by the results of the experiments, instituted by that gentleman.

¹ Op. Cit. p. 137.

In one of these: "three rabbits were secured. The aorta of one, was tied above the renal arteries, also the left common iliac, close to the aorta. In eight minutes the vena cava of the second was opened: the blood which immediately flowed, was injected into the aorta of the first. The contractility of both extremities was found to be equally vigorous. At the fourteenth minute, the degree of contractility having been ascertained, by the insertion of needles, attached to the wires of a galvanic battery, another quantity of blood was injected. No difference could, by careful examination, be discovered in the contractility of the muscles in the two extremities. The injection of venous blood, obtained from the cava of the third rabbit, was twice more repeated in the course of thirty minutes. At each interval, between the injections, the wires were equally applied to the muscles of both extremities; their contractility gradually and equally declined in each, as in experiments in which the artery is simply tied." Some feeble power of contraction survived an hour. In continuing his remarks upon this subject, Dr. Kay very properly concludes, that if the blood of asphyxia have a more hurtful influence on the functions of muscle, than the defect of arterial blood,—when we totally cut off the supply of blood to any muscle in asphyxia, its contractility ought to continue longer than the contractility of all the others, which are subjected to the influence of this fluid. This, however, he found, by experiment, not to be the case. In one animal he applied ligatures to the aorta and trachea at the same moment. The power of irritability remained for an equal length of time in the muscles of the lower extremities, which had their circulation arrested; and in the muscles of the upper extremities, through which the dark blood was circulating. To obviate any objections which might be made to this experiment, Dr. Kay applied a ligature to the trachea of one rabbit, at the same time that he intercepted the circulation altogether in another, by applying a ligature to the heart at its base:—the result was the same. These experiments appear to prove clearly, that the dark blood exerts no specific influence on the fibres of the voluntary

muscles. From another series of experiments, the details of which need not here be given, the same physiologist has drawn the conclusion, that not only has the venous blood no noxious influence upon the contractility of the voluntary muscles, but that its presence in these organs, or its circulation through their substance, absolutely supports their contractile power for a considerable period.

Allowing that the venous blood may act as a stimulus to support the contractility of the muscular system, it is possible that this stimulus may be merely that, arising from repletion of the vessels. Thus it was found in these experiments, that the contractility of the muscles of an extremity, was maintained for a much longer period when the vein was tied, than when the artery alone, was secured. On the same principle, as it has been already stated, the right cavities of the heart continue to manifest a contractile power after the action of the left cavities has entirely ceased. But it is not in this way we should explain the stimulating power of the arterial fluid: we cannot suppose this to act by bringing on a simple repletion in the vessels; and hence, then, it is hardly just to institute any comparison between the stimulating powers of the two kinds of blood on muscular fibre. The stimulus of the venous blood, although sufficient to maintain the phenomena of contractility in a limb, for some time after apparent death, is altogether insufficient to support its vitality. It cannot be assumed, whatever may be the nature or results of our experiments, that venous blood could be substituted for arterial, in the circulation of an extremity, consistently with the maintenance of its vital properties. Nor is it to be admitted, in my opinion, that we are justified in applying the conclusions, obtained from experiments on the circulation of reptiles, as of frogs and of salamanders, to the circulation in man, or the higher orders of adult animals, in which no such experiments can be attempted with any degree of safety. On this subject, Dr. Edwards remarks: "*On ne verrait pas facilement dans des expériences sur des animaux à sang chaud adultes, l'influence de la circulation veineuse, parceque la privation d'air cause si promptement la mort apparente,*

qu'il est inutile de chercher à déterminer de petites différences qui, d'ailleurs, pourraient ne pas être sensibles."¹ In making this admission, however, he states his opinion respecting the influence of the venous blood in the following words : " On ne saurait douter que la circulation du sang veineux ne contribue à entretenir la vie de ces animaux, après la cessation des mouvemens extérieurs, et durant cet état que nous désignons sous le nom de *mort apparente*." This opinion will be presently referred to, when I speak of the influence of venous blood on the nervous system; but in the meantime it may be observed, if we admit, with Dr. Kay,² that dark blood is less favourable than arterial, to muscular contractility, we cannot help considering that the kind of stimulus is very different in the two cases. In the case of arterial blood, the most common physiological reasoning, would lead us to suppose that the stimulus is of a direct and positive nature, while in the case of venous blood, it appears to me that no experiment, hitherto adduced, justifies us in concluding that this fluid influences the muscular contraction of an extremity, more than the injection of so much water at the same temperature. Dr. Kay has certainly established that the venous blood has not a positively deleterious action on the muscular fibre, as Bichat supposed : and hence we have to seek some other cause in order to explain the cessation of muscular contractility, when this fluid is circulated.

The most important part of Bichat's theory of asphyxia, relates to the operation of the venous blood on the brain and nervous system. His opinions on this subject, have been already generally alluded to, page 33 ; but it will now be necessary to examine the facts upon which this part of his theory, is founded. His first object was to shew the effect of the venous blood upon the brain, and this he endeavoured to accomplish in two ways : First, in mechanically propelling venous blood, taken from the jugular vein of one animal, through the carotid artery of another, so that it

¹ De l'influence des Agens Physiques sur la Vie, par W. F. Edwards, D.M. p. 277.

² Op. Cit. p. 150.

might take the course of the cerebral circulation. Secondly, in varying this experiment, so as to cause the heart of an animal, labouring under asphyxia, to propel venous blood through the carotid artery of another. The animal, whose brain received the venous blood in these experiments, became agitated;—its respiration became hurried; insensibility came on, and it finally fell into a state of complete asphyxia. Where the heart of one of the animals was used as a means of propulsion, the symptoms of uneasiness and disturbance of the animal functions, were slower in manifesting themselves, than where the venous blood was forcibly introduced into the carotid by a syringe. There was also a considerable difference in the ultimate effects of these experiments on the animal system. When the blood was introduced by means of a syringe, death invariably took place, whatever might have been the force employed in the injection: while, on the other hand, when the venous blood reached the brain, by the action of the heart, the animal would recover so soon as this species of transfusion was arrested; and it would commonly live after the symptoms of asphyxia had entirely disappeared. These are the chief of Bichat's experiments on this subject: the other facts which he adduces to corroborate his views, are of a general and of a much less conclusive nature. The most important of the inferences which he draws from the experiments above described, may be thus stated in his own words:¹ “ Que dans l'interruption des phénomènes chimiques du poumon, le sang noir agit sur le cerveau comme sur le cœur, c'est à dire, en pénétrant le tissu de cet organe, et en le privant par là de l'excitation nécessaire à son action.” By this it will be perceived, Bichat attributed the cessation of the cerebral functions to the loss of the stimulus necessary to cerebral action. They, therefore, who have undertaken experiments, to shew that the venous blood is possessed of no noxious properties; or to prove that it does not operate like a direct poison upon the nervous fibre, when circulated through the brain, appear to have altogether mistaken the meaning of this illustrious physiologist. In

¹ Op. Cit. p. 383.

some parts of his work, his language is certainly ambiguous ; but the extracts, already given (page 33), seem to me clearly to shew, that he left it open to other experimentalists to determine, whether the venous blood acted positively or negatively, when thus circulated. It is important to bear this in mind, in examining the objections which have been brought against the correctness of Bichat's observations relative to asphyxia ; since the experiments which prove that the venous blood is not directly poisonous under these circumstances, are far from establishing that the absence of arterial blood from the cerebral circulation, is not the essential cause of the suspension of the cerebral functions.

That a suspension of the functions of the nervous system, so far as they are manifested by external signs, must ensue, as soon as arterial blood ceases to be circulated through the brain, appears to be so well established in physiology, that it is needless to elucidate it. Of course I am here alluding to the circulation as it exists in man, and the mammalia, in their normal or healthy condition. Now it imports but little, in relation to the consequences, whether the brain be deprived of its natural stimulus, the arterial blood, by a total obstruction of the chief vessels supplying it, in which case no blood can circulate through its substance ; or whether a fluid like the venous blood, which is unfitted to stimulate it to the healthy exercise of its functions, should be transmitted to it, through its natural arterial channels. Under either condition, the cerebral functions must be arrested. In the former case, the arrest will take place immediately, while in the latter, the phenomena may be less rapidly manifested ; because it is even possible, that the venous blood may exert some slight influence as a stimulus to the nervous fibre. But it is necessary to observe, in making this admission, that no experiments hitherto adduced, which have been instituted upon man, or the higher orders of animals, satisfactorily establish that the venous fluid does operate as a stimulus to the brain, or to any part of the nervous system.

In what way does a physiologist explain the cessation of the cerebral functions in syncope ? He undoubtedly refers

the loss of sense and motion to a total absence of the arterial stimulus from the cerebral mass. Now, where the heart transmits venous blood to the brain, this operates as an insufficient stimulus ; and the same effect, namely, a disappearance of the functions of animal life, immediately follows. It is unnecessary to say more upon this subject, since these conclusions rest upon well known data in physiology, and we shall now, therefore, proceed to examine the objections which have been urged to Bichat's views.

The first objection requiring notice, is that which denies the circulation of venous blood in asphyxia, sufficiently degenerated to produce the effects observed.¹ This question has been already fully considered, and it is now only referred to for the purpose of stating, that, even if we allow, with the physiologist who makes the objection, that in asphyxia, the blood circulated, though darker than arterial, is not so dark as the venous fluid, we cannot but suppose that the asphyxial blood is not sufficiently arterialized to support the functions of the brain. This must surely be admitted, from the consequences which follow its circulation, namely, the loss of sense and motion. It is allowed that the asphyxial blood circulates for a certain period after the accession of asphyxia; and it is evident, that if it were capable of supporting the functions of the brain, the loss of sense and motion would not be instantaneous. At the same time, there are no experiments which shew that asphyxial blood possesses any greater influence over the brain, than the venous fluid: hence, then, the observations already made, with regard to the latter, are equally applicable to the former. Any objection, therefore, founded upon such slight differences, must be considered as entirely irrelevant to the principle of the theory.

The effects, observed by Bichat, to follow on the injection of venous blood into the carotid artery by a syringe, have been attributed to the undue pressure on the brain, which must be caused on the rapid introduction of so large a quantity of blood by violent mechanical means. This objec-

¹ KAY. Op. Cit. p. 182.

tion is well founded, and it is perhaps impossible to devise any experiments, on so difficult a subject, which would be considered perfectly satisfactory and conclusive. Indeed, it is impossible to conceive, that an animal can be placed under precisely the same circumstances, in the performance of such an experiment, as it is placed while in the state of asphyxia. Here venous blood is circulated by both carotid arteries; but in the experiments of Bichat and others, one carotid artery has been left free, so that venous blood has only reached the brain by one channel, while arterial blood has been transmitted to it by the vessels which were not involved in the experiment. In Bichat's experiments, the effects which followed, might have arisen from the mere distension of the cerebral capillaries, in consequence of the employment of a large instrument, and of too great a quantity of blood. There were no certain means of regulating the force employed in the injection, consequently it is possible, that too much force was used. Dr. Kay's experiments do not appear to me to place us in a better position for deciding the question. He injected a smaller quantity of blood, and employed a syringe with a minute capillary bore. He states, that he selected animals for the experiments, in which the carotid arteries were minute in comparison with the size of the capillary vessels of the brain; the animals seemed to suffer but little; they recovered, with one exception, and in this case, death took place, owing to disease of the brain. It must be obvious, from a careful examination of these experiments, that they are wholly unfitted to give us a correct idea of the effects of the venous blood, when circulating through the cerebral structure. Not more than four drachms of blood were injected in any one instance: this injection was made by small portions at a time, and, into a vessel, the caliber of which, it is acknowledged, was small in comparison with the whole of those concerned in the cerebral circulation. Moreover, arterial blood was at the same time propelled to the brain by the heart, through that carotid which was left untouched, as well as through the vertebral vessels. How, therefore, is it possible to affirm, under these circumstances, that the venous blood is a less nutritious and stimulating fluid than

arterial blood ; or that it may circulate through the cerebral mass without producing, by its contact with the brain, a sudden suspension of the functions of the nervous system ? If it had been affirmed that three or four drachms of the venous fluid might be injected, and might circulate through a small part of the brain without producing such effects, it would have been a more correct conclusion. The results of such experiments do not militate against the common theory of asphyxia, any more than the results observed in the placing of a ligature on one of the carotid arteries : in which case, the cerebral functions continue, in consequence of the free supply of arterial blood by the numerous anastomosing channels. The subject appears to be beyond the reach of experiment ; because we cannot understand how an animal can be placed in the precise conditions in which it is during asphyxia, without the occurrence of apparent death ; and when this occurs, it is certainly impossible for us to form any idea of the nourishing or stimulating properties of the venous blood on the nervous system.

In order to strengthen the conclusions derived from his experiments, Dr. Kay endeavours to draw an analogical argument from the researches of Dr. Edwards. The experiments of this physiologist, in his view, prove that venous blood, though incapable of supporting life for an indefinite period, exerts no positively noxious influence on the nervous system of animals. To determine this point, Dr. Edwards excised the heart and the bulb of the aorta in a certain number of reptiles, chiefly frogs, toads, or salamanders : by this he entirely destroyed the circulation in these animals. He now placed them in conjunction with others, which were healthy and entire, in an asphyxiating medium, namely, in water which had been deprived of air by boiling. In the animals, which were entire, the circulation of course continued ; but the blood circulated must have had all the venous characters. These animals, he found, survived the others in which the heart had been excised, a considerable period ; and he therefore concludes, that the venous blood, circulating in these latter, must have been the cause of their surviving.

In drawing this conclusion from the experiments, no allowance appears to have been made for the shock which, we should presume, would be given to the nervous system of these animals, by the violent excision of the heart. If it be asserted that they could not experience such a shock, because their nervous system is less dependant on the integrity of the circulation, this, surely, is sufficient to remove all experiments performed on such animals, from the analogy which is attempted to be instituted between their physiological condition in asphyxia, and that of more perfect beings. That the circulation of venous blood in reptiles, is not incompatible with the maintenance of the nervous functions, for a longer or shorter period of time, is an indisputable fact : but there are, probably, few physiologists who would be disposed to admit this, as a proof that the functions of the nervous system in man and the adult mammalia, can be supported by similar means. It would be equivalent to abandoning evidence, derived from direct observation, for the evidence yielded by a remote analogy. If we were inclined to follow up such an analogy, we might make use of it to shew that the existence of an organic sensibility of the pulmonary capillaries, on the influence of which the arrest of the circulation is assumed to depend, is, by it, entirely disproved ; for, although it does not appear to have been precisely ascertained how long the circulation continued in the frogs and salamanders which were entire when immersed in water, yet we must suppose, if the venous blood had any effect in the support of the nervous functions for the number of hours which they are stated to have survived, it could only have been by its free circulation through the lungs for a considerable period.¹

These facts have been adduced to shew that the venous blood is capable of supporting the functions of the nervous system ; but they do not appear to me to be in the least degree applicable to the explanation of the phenomena of

¹ Dr. Edwards states, that the difference in the duration of life, was considerable. The salamanders, in which the circulation was suppressed, lived from seven to eight hours ; while those, in which the circulation continued, lived twenty-four hours.—EDWARDS. Op. Cit. p. 276.

asphyxia in man or the higher mammalia. Dr. Edwards, aware of this, instituted similar experiments upon the young of mammiferous animals; and he found, that while those, which remained entire when immersed in water gave signs of life at the end of half an hour, the others, in which the hearts were excised, rarely survived their submersion, a quarter of an hour. With every respect for the opinion of this eminent physiologist, I should prefer considering that the slight difference observed in the results, depended rather upon the great violence which had been inflicted on the animal, in the removal of the heart, than upon the circulation of venous blood in the animal which was immersed uninjured.

From all that has been previously stated, it appears to me, we are justified in concluding, that if, in the state of asphyxia, venous blood possess any power of nourishing or stimulating the nervous system, this power has not been shewn to exist in it, at least this must be our conclusion, so far as concerns man, to whom, be it remembered, our observations are now chiefly directed. According to Dr. Kay, the cerebral disturbance arises partly from the diminution in the quantity of blood circulated, and partly from the asphyxial blood being less capable of maintaining the organic motions of the nervous system. He admits, that, were this fluid to circulate freely through the brain, its functions would, "ere long," be suspended from the want of stimulus and nourishment. Now we contend, that the deficiency in the quantity of blood is not a cause, but a consequence, of the cessation of the functions of the nervous system,—that the cerebral disturbance proceeds from the want of its usual stimulus to the brain, namely, the arterial fluid; and that this disturbance takes place on the moment that the venous blood reaches that organ. Life, therefore, according to this view, does not cease in asphyxia because the circulation is arrested in the lungs, but because the functions of the nervous system are destroyed: this destruction, as first explained by Bichat, being antecedent to the stoppage of the respiratory process.

The subject of asphyxia has been thus fully treated of, in consequence of the very close relation which it has to many kinds of death, from accident or violence. In drowning, hanging, strangulation, and suffocation, death is said to take place by asphyxia, and it is therefore necessary for the elucidation of the intricate physiological questions which are likely to arise, in investigations relative to these forms of death, that the medical jurist should be acquainted with the theories which have been brought forward to explain this condition of the body. It is unnecessary, at the present time, to make any reference to the particular questions which he is liable to be asked on such occasions; for these will be more appropriately stated in speaking of each kind of death. But it is essential that he should be prepared to give a general account of the phenomena which have been discovered by physiologists, to accompany and follow the state of asphyxia,—from whatever cause it may arise.

CHAPTER II.

REAL AND APPARENT DEATH.

Nature of the subject,—observations of Winslow and Bruhier,—credulity of these writers,—questions proposed,—evidence of real death, on what founded.—Signs of dissolution,—I. *Facies Hippocratica*.—II. The state of the eyes,—objections to the supposed infallibility of this sign.—III. State of the skin in real death.—IV. State of the muscular system,—cadaverous irritability,—cadaverous rigidity,—order in which it attacks the muscles,—period of its duration,—period of its accession,—this rigidity not influenced by the nervous system,—a constant attendant on death,—rigidity observed in certain diseases,—conclusion respecting this sign of death.—V. Loss of animal heat,—time required for the cooling of the body,—circumstances which accelerate or retard it,—coldness of the body in malignant cholera,—return of animal heat after death,—coldness of disease distinguished from that of death.—Loss of sense and motion.—VI. Cessation of respiration and circulation,—phenomena observed relative to the interruption of these processes,—voluntary power of suspending these functions,—case of Colonel Townshend,—state of hybernation in animals.—VII. Putrefaction, an infallible evidence of death,—changes produced by this process in the body,—conditions absolutely requisite to its establishment.—Subordinate conditions which influence the period of accession, the rapidity and duration of putrefaction,—concluding remarks on Real and Apparent death.

AN investigation of the reality of death, in individuals presumed to be dead, is considered to belong to the province of a medical jurist. Accordingly, we find, that, in most works upon the science, the subject of apparent death, and the signs indicative of real death, have been fully treated of, in order to remove all possibility of the premature interment of the living. If we were to place any confidence in the cases which have been collected by some writers, to shew the fallibility of the common signs of death, we might be induced to believe, that the subject, into the discussion

which we are now about to enter, was of a highly important nature. But it will be seen, hereafter, that its importance depends, not so much upon its application to the detection of real death, as to the elucidation of many interesting phenomena, connected with the dead body, which may become objects of judicial inquiry.

Before proceeding to state those changes which are considered to be the certain indications of death, we may inquire whether there be any foundation for the apprehensions relative to the premature interment of the living, which some writers, of acknowledged ability, have endeavoured to raise. Winslow and Bruhier were among the first to direct the attention of the profession to the ambiguity attendant on the ordinary signs of death. Winslow is said to have been twice pronounced dead; and it was chiefly on this account that he directed his inquiries so closely into the phenomena of death. M. Bruhier devoted many years of his life to the investigation of this subject; and, about the middle of the last century, he published a dissertation, "*Sur l'incertitude des signes de la Mort*;" in which he states, he had discovered, in the course of his researches, that fifty-two persons had been buried alive; four had been opened before death, and seventy-two had been pronounced dead, who were really living. The evidence upon which the cases, related by these and other writers, are made to depend, is of the most frivolous description; and we should be entirely at a loss to account for the credulity manifested by the reporters of such cases, did we not know that this credulity was strongly based on popular superstition, and that it coincided with popular belief.

If, however, in this circumstance, we can find an apology for the writers of the last century, we cannot, on the same grounds, exculpate those who have been the means of disseminating such idle fictions within our own time. They have thereby given to them an authority which they did not merit; and, by admitting their belief in the authenticity of these statements, they have contributed to keep alive a feeling, which it should have been their object to remove. What can be more condemnable, and, at the same time, less supported by fact or observation, than the assertion of Mahon,

that,—“ the causes of apparent death are so numerous, that we cannot be too watchful of our own destiny, or of that of our relatives and friends ?”¹ Where are the grounds for such an assertion ? Certainly not in any observations of his own ; for the cases which he brings forward, in support of his views, are derived from old and obsolete writers, whose credulity was only equalled by their ignorance of natural phenomena ; and whose opinions, be it remarked, upon any other physiological question, Professor Mahon would, probably, have treated with contempt. The cases alluded to, are chiefly derived from the *Journal des Savans* ; they rest upon no real authority ; and the details bear so evidently the stamp of fiction, that they require only to be read, to be disbelieved. The cases recorded by Foderé, are also equally spurious :² there is not one, the details of which will bear a close investigation ; and the reader may well be astonished to find, that a writer of great merit and authority, like M. Foderé, should lend himself so readily to be a reporter of such palpably fictitious statements. It must be evident, indeed, to all, that, when we are obliged to refer back to the times of *Diogenes Laertius*, and *Pliny*, there must be a great deficiency of modern cases, to support the views of those, who consider that life may remain in the human body without giving any manifestation of its presence. Even Orfila, whose writings generally display great philosophical acumen, and a rigid adherence to facts, has given way to this general credulity, and has prefaced his remarks upon the subject of apparent death, by a reference to the case of François de Civille, who, according to the legend, was buried and resuscitated three times ; and who, in signing any legal document, constantly designated himself, as “ *ter mortuus, ter sepultus, terque, gratiâ Dei, in vitam redditus.*”³

It is not, then, from any importance being attached to the cases of resuscitation from apparent death, recorded by

¹ MAHON. Médecine Légale. Vol. II. p. 185, Paris, 1811.

² FODERÉ. Médecine Légale. Vol. II. p. 339, et seq.

³ ORFILA. Médecine Légale. Tome II. p. 180, Paris, 1828. Vide also MAHON. loc. cit.

Winslow, Bruhier, or others, that we are induced to devote a chapter to this subject ; but, from the consideration that there are many occasions in which a knowledge of the phenomena, accompanying and following the state of dissolution, will be of service to the medical jurist. The first and most obvious question to determine, is, whether there be any condition of the living human body which so closely resembles death, as to render it impossible for a well-informed person, to decide with certainty on the fact. A second question is, whether, if there be such a condition, this appearance of death, can continue for many hours or days without some changes developing themselves in the body, which must lead to the satisfactory determination of its being living or dead. If, in all cases, a proper time were allowed to elapse before interment, and if we could ensure that the body should be seen by a medical practitioner, or any well-informed person, previously to interment, we might rest satisfied, by simply answering these questions in the negative. But although, in general, a sufficient time is allowed to elapse in this country, and there are few who die, who have not received medical assistance, and, therefore, have been seen by a medical man ; yet we may conceive, that the interment might be sometimes premature, and the individuals, who have to decide on the reality of death, might be incapable of distinguishing this state from that of apparent lifelessness, brought on by exhaustion. It is only in such cases as these, which must be extremely rare, that any risk of premature inhumation is likely to be incurred ; and, probably, in most, if not in all, of these cases, the speedy interment of the body, would be found to arise rather from criminal motives, than from real ignorance of the subject, on the part of those concerned.

The strongest evidence of real death, must of course be derived from the absence of all those phenomena which characterize the living state. There are some of these, which, from influencing the exterior of the body, are as appreciable by the casual observer, as by the medical practitioner. There are others, again, which are closely connected with the arrest of the circulation, and the loss of

nervous energy,—these are only to be appreciated by the physiologist; and it is upon the presence of these, that, in all doubtful states of the body, a physiologist would found a decisive opinion.

The first of the signs of dissolution, commonly mentioned, is what has been termed the “*facies Hippocratica*.” It has been thus called, from the accuracy of the description of the countenance of a dying man, given by Hippocrates.¹

Firstly. *Facies Hippocratica*. It would be difficult, by any description, to convey an accurate idea of the general expression in the countenance of a dying person, where death takes place after long and continued suffering; yet the *facies Hippocratica*, may be regarded as a near approximation to this, and as thereby affording very certain evidence of approaching death. The forehead is dry and wrinkled,—the eyes are sunk,—the nose pointed, and surrounded by a dark discolouration,—the temples are hollow, depressed and wrinkled,—the ears are raised,—the lips relaxed and pendant,—the cheeks are fallen,—the chin is wrinkled and pointed,—the skin dry, and of a leaden hue,—the hairs of the nostrils and eyebrows are covered by a dull white powder, and the features are so distorted and changed, as to render the individual no longer recognizable.

The *facies Hippocratica*, thus described, must be regarded as rather a precursor of dissolution, than a sign of death. It is far from being universally met with:—where death has taken place suddenly, or from acute disease, it is not observed, and even in those instances in which it is observed, it speedily disappears, after the vital principle has left the body. In all cases the appearance is fleeting. So far, then, the *facies Hippocratica* can serve but little as a diagnostic sign of real death. Foderé remarks, that he has witnessed the *facies Hippocratica* in living individuals;—a strong impression of danger,—the apprehension of a dreadful punishment, or the anticipation of certain death, may, according to this writer, suffice to bring about a state of the countenance, similar to that described.* In all these instances, however,

¹ HIPPOCRATES de Morbis. Book II. Sect. v.

² FODERÉ. Méd. Légale. Tome II. p. 357.

the causes of it will be sufficiently apparent ; and we are not likely to fall into the error of pronouncing such persons dead. Where it is observed in an individual, lying apparently dead, it is not upon the mere presence of this appearance, that a rational man would decide at once upon his death, and hastily consign his body to the grave. Time would be allowed for the development of other phenomena, consequent on dissolution, and of course, under these circumstances, all uncertainty on the point would be removed.

Secondly. *The state of the eyes.* A second mark of dissolution, has been found in the state of the conjunctiva and cornea. Shortly before death, it is observed that the conjunctiva becomes covered by a glairy mucus, somewhat difficult to remove, which possesses almost a membranous character. The cornea, at the same time, becomes dull ; —and very shortly after dissolution, its brightness and prominence disappear,—it becomes collapsed, and, after a time, wrinkled. These changes in the cornea are attributed by some physiologists to the loss of the aqueous humour by evaporation. Professor Louis, who has written on the “Certainty of the signs of death,” paid particular attention to these appearances of the eye. He observes, “that the loss of brilliancy in this organ, and the investment of the conjunctiva by a mucous film, are not to be regarded, as certain signs of death ; since the eye will often assume these characters from various causes, while the individual is living. But, he continues, “the eyes of the dead become flaccid and soft in a very few hours after dissolution ; and this flaccidity and softness, the eyes never assume in the living human body. This appearance may be considered as truly characteristic of death ; and when it clearly exists, we need not wait for the commencement of the putrefactive process.” It is necessary to observe, however, that it is not always met with in the dead. In those who have died from apoplexy, or from the inhalation of carbonic acid gas, the eyes have often been observed to preserve their brilliancy and prominence for a length of time. It is said that this is also the case in those who have been poisoned by prussic acid ; although

observations are wanting to establish this point satisfactorily. Orfila remarks, that incipient putrefactive changes might, by forcing the blood towards the head, cause a prominence and brilliancy of these organs, in those subjects in which they were dull and collapsed soon after death.

These observations shew, that the changes in the eye described by Professor Louis, are not constantly met with; but in any of the above-mentioned instances, the circumstances under which the individual died, will sufficiently explain why they are absent. In the case, imagined by Orfila, where a body has been exposed long enough to enable the eyes to resume their brilliancy, as an effect of incipient putrefaction, other phenomena will have occurred, sufficiently decisive of the death of the individual. None of these cases can affect the conclusion of Louis; for he only speaks of our forming a judgment from the presence of this sign of death; and he does not pretend to infer, from its absence, that the individual is necessarily living. Louis contended that there was no condition of the living body which would give to the eyes, the characters which he described as a consequence of death. Some medical jurists have, however, disputed this statement, and have affirmed that, in certain states of asphyxia, the eyes may become equally sunk, flaccid, and invested by a mucous film; and it is stated by Foderé, on the authority of M. Desgranges, that individuals, who have been taken out of the water, apparently drowned, have been resuscitated by the usual means, although their eyes presented the appearance above described. But the circumstances under which this state of the eyes is observed, must be, generally speaking, such as to leave but little room for doubt: it is usually accompanied by other changes in the body, when really a consequence of death, and it is from these concomitant phenomena, and not from one symptom only, that a judgment is formed respecting the reality of death.

Thirdly. *The state of the skin.* After dissolution, the skin is observed to become extremely pallid, owing to the absence of all circulation. In some parts, it becomes covered by livid or ecchymosed discolourations, and this is especially the

case in those instances, where death has taken place by asphyxia. One of the most striking changes in the skin, is its entire loss of elasticity. In the living body, if any part of the surface be compressed, the skin will readily return to its original form, on removing the pressure. Thus, in a doubtful case, a flatness of those parts, which have been allowed to lie upon an even surface, may be regarded as a sign of real death, provided the other concomitant changes be observable. It is unnecessary to observe, that if certain diseases have the power of depriving the skin of its elasticity, the history of these cases, or a superficial inspection of the body, will suffice to shew to what cause, this want of elasticity is to be attributed.

Fourthly. *The state of the muscular system.* It is in the changes which take place in the muscular system, that we shall find very satisfactory evidence of the reality of death. For some time after the respiratory process has ceased, the muscles remain irritable and contractile on the application of different stimuli. This cadaverous irritability, as it has been termed by BÉCLARD,¹ gradually disappears, becoming confined to particular parts of the muscular system, before its entire disappearance. Finally, when this general and local irritability has ceased, cadaverous rigidity supervenes; so that, after the accession of this state, the muscles are no longer excitable by stimuli. The muscles of the trunk and neck are the first to acquire this rigidity: it then takes place in the muscles of the upper extremities, and lastly, in those of the lower. The order of its disappearance, is somewhat similar; for the muscles of the lower extremities will often be found rigid, while those of the trunk and upper extremities, are again in a state of relaxation. In whatever position, the members and trunk may be, at the time this rigidity takes place, they will retain it without the least alteration, so that one limb may become rigid in a state of extreme flexion, while the opposite becomes rigid in a state of extreme extension. In this fact, then, we have a proof that there is no exertion of

¹ BÉCLARD. Anatomie Générale. p. 575.

antagonizing forces, such as we witness in the living and healthy subject; for the muscles preserve the exact position in which they were, at the time that the animal heat was disappearing.

We are chiefly indebted to Nysten for our knowledge of the phenomena which accompany this singular state.¹ This physiologist discovered, that the longer the period after dissolution before the muscular rigidity made its appearance, the longer was its duration; and where, on the other hand, it speedily supervened, it rapidly disappeared, all other circumstances being equal. He observed, that the rigidity continued for six or seven days, in individuals who had been of a strong and robust constitution; and in whose bodies, it did not begin to make its appearance until sixteen or eighteen hours after death. When death proceeds from the same cause, the rigidity is always greater, and continues for a longer period, in those subjects in which the muscular system is fully developed, provided the muscles have remained unaffected by disease. It would appear from the observations of Nysten, that the malady of which the patient dies, has a remarkable influence on the degree and duration of this state of rigidity. When death takes place from acute inflammation of the stomach or viscera, as a consequence of irritant poisoning, or from the inhalation of the deleterious irritant gases, which exert no specific influence on the contractile power of the muscles, as in the case of the ammoniacal gas, of chlorine, and the dentoxide of nitrogen, the rigidity is commonly very strongly developed; and, *cæteris paribus*, will last for a considerable period. When death is occasioned by diseases of a cachectic or of an adynamic character,—by the inhalation of the sulphuretted hydrogen gas, or indeed in all those cases where there is great exhaustion of the system prior to dissolution, the rigidity speedily attacks the muscles, and sometimes disappears in the course of two or three hours.

This state of rigidity, does not begin to make its appearance until the heat of the body becomes in some degree dissipated; whence it follows, that by plunging the body

¹ Recherches de Physiologie et de Chimie Pathologique. Paris, 1811.

into a warm bath, by placing it in a very warm atmosphere, or wrapping it in warm articles of clothing, the period of its accession may be retarded, or, on the other hand, by plunging the body into a cold medium, or exposing it to a cold atmosphere, its appearance may be accelerated. It is important to bear in mind, that, in certain cases of asphyxia, as by hanging, or from the inspiration of carbonic acid gas, the animal heat is retained for a considerable period, and, consequently, the rigidity does not develop itself so rapidly in these cases, as in other more common forms of death. A knowledge of this circumstance, will be found useful where individuals are discovered recently dead, and where it may become necessary, for judicial purposes, to determine the period at which death probably took place. It was by evidence of this kind, that the medical witnesses were enabled to fix approximatively, the period of death in the case of the late Duke de Bourbon ; and the determination of this point, served, in some degree, to disprove the charge of homicide.

It has been remarked, that muscular rigidity does not appear until the animal heat begins to leave the body. Morgagni,¹ however, relates cases wherein it was almost immediately consequent on death, the rigidity commencing while the body was yet warm. Professor Louis² has made some observations on this subject, which support the statements of Morgagni. He remarks, that from many years' uninterrupted observation, made on more than five hundred subjects, at the moment of dissolution, he had found that the joints became rigid and more or less inflexible, even before there was any sensible diminution of the animal heat. In his opinion, this character of death is so well marked, that we may pronounce a person to be yet living, in whom the limbs are flexible, although there may be no other sign of life. Of course, this observation is restricted to those cases, which are seen soon after the accession of apparent death, and in which all other signs of

¹ MORGAGNI. De causis et sedibus Morborum.

² De la Certitude des signes de la Mort.

death are wanting. Rigidity may then take place in a part, while some warmth remains in it, although it is doubtful whether it take place so speedily as Louis supposed, except in some extremely rare instances. Indeed, that it is not so closely connected with the disappearance of animal heat as Nysten and others have imagined, is proved by the fact, that the lower extremities, which cool the most rapidly, are not commonly attacked by rigidity until after the muscles of the trunk, which retain their warmth for a much longer period.

Putrefaction does not commence until this rigidity has ceased, and the muscles have again become soft and pliant. It has been remarked, by Béclard, that, if a muscle, in this state, be detached and preserved in alcohol, it will remain rigid for an indefinite period of time.

Cadaverous rigidity is exclusively confined to the muscular system. So long as the muscles remain entire, the limbs remain inflexible, unless very great violence be employed. When the muscles are cut or lacerated, it disappears. Many physiologists have considered it to be the last effort of muscular contractility, and John Hunter regarded it as the last act of the vital principle. Nysten attributed it to the whole of the remaining vital powers becoming concentrated within the muscles, at a time when the phenomena of life are about to cease altogether. It appears to be independent of all influence on the part of the nervous system; for it does not manifest itself until the nerves are no longer susceptible of the galvanic stimulus. A division of the nerves, or even the entire removal of the brain, according to Béclard, will not prevent or retard its accession.¹ Where death has taken place under a state of hemiplegia or apoplexy, the cadaverous rigidity is as strongly manifested by the muscles of the hemiplegic side, as by those which are on the opposite side. It may be regarded as a constant and uniform attendant on death: this is the conclusion at which those, who have devoted considerable attention to the subject, have arrived. Haller, Bichat, and some other physiologists, have contended that it does not always take place in the dead body.

¹ BÉCLARD. Anatomie Générale. p. 577.

It has been asserted, that, after death from lightning, or from the inspiration of sulphuretted-hydrogen gas, the muscles do not become rigid: these assertions, however, have been founded on very limited observations; and it is quite possible that, in the recorded cases, the bodies may have been seen by the observers either before rigidity has commenced, or long after it has terminated.

It now, then, remains to be considered, whether there be any condition of the living body which may be confounded with this state. Certain diseases of the nervous system, have been mentioned as liable to produce a condition analagous to that described. Tetanus, apoplexy, catalepsy, syncope, asphyxia, and the effect of intense cold on the body, are enumerated as cases, in which a rigidity of the muscular system may be met with, similar to that observed in the dead. Even if we admit that the whole of these diseases may cause the muscles to become rigid while the individual is living, the means of distinguishing between this state and that of the dead body are remarkably simple. Except in the case of inanition, arising from exposure to cold, the warmth of the body is generally preserved. Besides, in the diseases above mentioned, the rigidity takes place simultaneously with the suspension of respiration, circulation, and other vital phenomena: it attacks the whole of the body at the same time, and while the animal heat is preserved. In the dead body, on the other hand, a certain interval, usually of some hours' duration, always exists between the period at which the individual becomes apparently lifeless and that at which the muscular system becomes rigid: the rigidity does not attack the whole of the muscles simultaneously, and it is rarely observed until the heat of the body, has become, in a great degree, dissipated. In order to distinguish the state of spasm, in a living extremity, from the rigidity of death, it has been proposed to move the extremity forcibly from the position in which it is apparently fixed: if, after having performed this motion, the member suddenly return to its former position, it is a clear proof that life is still present; for, if the rigidity be that of death, the limb, when once forcibly moved, will not spontaneously return

to its original position, but it may be freely moved in every direction.

It is scarcely necessary to observe, that the rigidity which proceeds from exposure to intense cold, must arise from congelation of the soft parts. The circumstances under which the body is found, as well as the peculiar crepitation heard, on attempting to move one of the extremities, are indicia, which will not allow of the existence of any ambiguity on the subject. In malignant cholera, we may meet with great coldness of the body, and, at the same time, a rigidity of the muscular system, before death; but the rigidity in this disease is described, by most observers, as not being generally permanent: it takes place at intervals, and other signs of life are always present. In death from cholera, it has been frequently remarked, that cadaverous rigidity has very rapidly followed, and lasted for a considerable time; in some instances, it is stated, that it did not wholly disappear until after the lapse of four or five days.

A rigidity of the muscular system, commencing some time after the apparent suspension of all vital phenomena, and while the body is rapidly cooling, may then be regarded as affording the most indisputable evidence of death. When taken in conjunction with the next sign, it is as infallible as the putrefactive process itself. Bruhier, Mahon, and others, who have endeavoured to prove that no reliance is to be placed on any evidence of the reality of death, except that derived from the access of putrefaction, have scarcely noticed the phenomena connected with cadaverous rigidity. A proper investigation of these phenomena would have dissipated those vain fears, which they seem to have entertained, and which they endeavoured to excite in others relative to the frequency of the premature interment of the living; for this rigid state of the muscular system, is as certain a forerunner of putrefaction, as putrefaction itself, is a forerunner of the utter dissolution of the body.

Fifthly. The loss of animal heat. Coldness of the body is a sign which is never wanting in real death. In those who die in consequence of disease, it begins to manifest itself, before death, in parts remote from the circulation, as in the

hands and feet. Under common circumstances, this coldness of the body is rarely complete until after the lapse of fifteen or twenty hours from the period at which all vital phenomena become suspended. In some cases, the body will cool in two or three hours, while in others, it will retain its warmth for thirty-six hours, or even for a longer period. The loss of heat continues until the human body, like any mass of inanimate matter, acquires the temperature of the medium in which it is immersed. It rises and falls with the alterations of temperature, and thus the organized frame is proved to have lost a power which is so highly characteristic of the living state; namely, of preserving a temperature, independent of that of the medium in which it is placed. According to Orfila,¹ there are many incidental circumstances which may accelerate or retard this loss of heat in the dead body. The animal heat is preserved, *cæteris paribus*, for a longer period when death has taken place in consequence of apoplexy or acute disease, than when it is the result of hæmorrhage, or of chronic disease. In regard to death from asphyxia,—if the asphyxia has been produced by the inspiration of carbonic acid gas, or by strangulation, the body does not become so rapidly cold as when the asphyxia is the result of drowning. If the subject be much loaded with adipose matter, the cooling will take place more slowly, than if it be thin and emaciated. The body of an adult is observed to cool less rapidly than that of an aged person. The circumstance of the body being wrapped up in flannel, linen, or other articles of dress, will also retard its cooling; for these articles exert an influence, as non-conductors. So long as the body retains its warmth, the blood retains its fluidity, but when it has entirely cooled, the blood becomes coagulated.

It has been said, that this sign is a constant attendant on death. Certain phenomena have, however, been noticed in the bodies of those who have died of malignant cholera, which appear to form an exception to this rule, and have not, hitherto, received a satisfactory explanation. One of

¹ ORFILA. Méd. Lég. Tome II, p. 183.

the most characteristic symptoms of this disease during life is the extreme coldness of the surface which attends its progress ; while, after death, in some instances, a gradual disengagement of heat has been observed to take place from the abdomen, and, sometimes, the body, which had become moderately cold, was observed suddenly to resume its warmth, so that the temperature is stated to have risen, on more than one occasion, as high as 86° or 87° F.¹ In order to explain these extraordinary facts, we must consider, that, in the cases mentioned, death was only apparent; for we cannot conceive such phenomena to have taken place in a body in which life had entirely ceased. Some observers have also described the occurrence of convulsive twitchings of the muscles during this state of apparent death from cholera. Still, after a time, all these phenomena disappeared, the body lost its heat, rigidity came on, and the evidence of death became conclusive. Until this evidence had been obtained by the occurrence of these indisputable signs of the reality of death, it would have been an act of barbarism, to designate it by no worse term, to have consigned the body to the grave : and we may rest assured that no premature interments took place in the individuals who were cut off by this disease, unless through the most criminal negligence of those on whom the duty devolved of burying the dead. The period allowed by the law, during the prevalence of this fatal malady, within which interment was ordered to take place, was sufficiently long, to allow the most ignorant observer to decide on the reality of death.

Foderé and Mahon object to the conclusiveness of the evidence, derived from the cooling of the body, because, according to them, cases have been known, where the bodies of individuals, apparently dead, have retained their warmth for four days and upwards. Even if we admit the cases alluded to, to be authentic, the fact stated cannot affect the value of the evidence derivable from this sign of death ; since the error into which it would obviously lead us, would be that of pronouncing such individuals to be living, and by this we should avert the possibility of premature interment. If so

¹ Papers published in the Medical Gazette. 1832-3.

remarkable a circumstance occurred, as the preservation of animal heat for so long a period, in an apparently lifeless body, when all other circumstances favoured its cooling, it could only be ascribed by the physiologist to the continuance of some imperceptible vital action within the organized frame. It would so far differ from the common consequences of death, as to justify him in ordering interment to be delayed until these phenomena disappeared. It may be urged that such cases might occur to ignorant and uninformed persons, who would not be able to appreciate these physiological niceties : if, however, we admit this, we must at once allow, that premature interment cannot depend upon any uncertainty in the signs of death, but upon absolute ignorance on the part of those, who form a decision in such cases. A more important question is, whether there be any coldness of the living body which we can mistake for that of death. The authors above mentioned state, that the surface becomes pallid and cold in intermittent fever, in syncope, in hysteria, and in certain cases of asphyxia, as in the bodies of the drowned, while life is yet present. Foderé relates, on the authority of *Sylvius*, that several females under hysteric attacks have remained, during three days, in a state of apparent death, in which all vital phenomena had ceased, and the surface of the skin was extremely cold. Such cases may be rejected, from their utter improbability; for to believe that individuals could recover after three days of entire cessation of all vital phenomena, requires a greater share of credulity, than will be found to be possessed, probably, by any of the present race of physiologists. It may be safely affirmed, that a coldness of the body, during life, can never be mistaken for the coldness which proceeds as the consequence of death. In intermittent fever, other signs of life are present : in syncope and hysteria, the coldness takes place suddenly, either at the time of the attack, or it immediately precedes it. An individual can remain but a very short period in a state of perfect syncope, without either dying or recovering ; in hysteria, besides being cold, the body may be rigid, and there may be a loss of sensation and motion : but respiration and circulation continue, though

feebly, and if the individual be really living, it is not long before some signs of life become manifested. In asphyxia from drowning, a body may be perfectly cold and rigid, when taken from the water,—in such a case, there can be but a slender chance of resuscitation; but, at the same time, it is not the mere coldness of the body which would deter a well-informed person from applying the means for resuscitation, unless the body had obviously been in the water for so long a period, as to render all attempts useless. The coldness which attends upon an attack of malignant cholera, is more striking than that which is observed under the influence of any other disease, but, as it has been already remarked, it is impossible that this coldness can be mistaken for that of death; since the signs of life are in other respects so very evident.

From all that has been said, then, relative to this sign of dissolution, we may consider it as certain, unequivocal, and satisfactory; and, when taken in conjunction with the muscular rigidity already described, it will be quite unnecessary to wait for the access of putrefaction.

Insensibility and immobility have been enumerated by Mahon and others among the signs of death. In all cases of apparent death, an entire loss of sense and motion, is presupposed; but both of these faculties may be temporarily absent in the living, as in a case of syncope or asphyxia, or in injuries to the brain. Under any of these conditions, however, it would speedily be discovered whether the death were apparent or real.

Sixthly. *The cessation of respiration and circulation.* As life is chiefly known to us by the uninterrupted continuance of these processes, so is their cessation, if prolonged but for a very short period of time, a certain indication of death. The most credulous of the writers on the subject of apparent death, admit, that, if these processes can be clearly proved to have ceased for a certain period, it may be considered as unequivocal evidence that death is real. At the same time, they deny that it is easy to determine this point with precision. The act of respiration, it is said, may be so

slowly conducted that the motion of the parietes of the thorax, will be imperceptible to the ordinary observer: at the same time, the circulation may be confined to the large vessels in the neighbourhood of the heart and lungs; and the motion of the heart may be too slight to be perceived by the simple application of the hand to that portion of the chest to which the apex of the organ corresponds. We have an illustration of this condition of the living body, in syncope or asphyxia; but we know that life cannot long continue under this suspended state of the respiratory and circulating functions. The individual will either speedily recover, or he will sink, and consequently, a very few minutes will suffice to determine whether the death be apparent or real. Foderé seems to think that life may continue, notwithstanding the arrest of the respiratory function; for he believes that the skin may take on the office of the lungs, and that this organ may suffice to maintain a degree of vitality in the system, not incompatible with ultimate resuscitation. Such an opinion is altogether opposed to common observation, and it is founded upon an analogy, the correctness of which no physiologist will be disposed to admit.

It is unnecessary to speak of the methods which have been proposed to determine, whether the act of respiration be entirely arrested or not, in a case of apparent death. If the motions of the chest be not perceptible to the eye of an attentive observer, they are still less likely to be appreciated by the means proposed. Whatever may be the cause of the suspension of the respiratory process, it is quite certain that doubt cannot be long entertained on the subject. The process must be speedily restored, or it must finally cease; and so well is this understood, that it is chiefly on the cessation of this necessary act of vitality, that the vulgar decide on the reality of death.

That life is not incompatible with the temporary suspension of the functions of circulation and respiration, is proved by the occasional recovery of asphyxiated individuals, notwithstanding the state of apparent death in which they are discovered. The period within which such attempts can be

made with any hope of ultimate success, is, however, very limited : but it is probably liable to variation, according to the nature of the cause by which the asphyxia is induced.

A few cases have occurred, in which persons have possessed the power of suspending these vital functions by a mere act of volition, and consequently of assuming all the characters of apparent death, with a possibility of resuscitation. One of the most remarkable of these cases, is that of Colonel Townshend, recorded by Dr. Cheyne. The doctor states that this gentleman insisted on performing the experiment in the presence of himself, Dr. Baynard, and Mr. Skrine. The result of this experiment, may be thus stated in an extract from Dr. Cheyne's report of the case. " We all three felt his pulse first ; it was distinct, though small and thready, and his heart had its usual beating. He composed himself on his back, and lay in a still posture some time ; while I held his right hand, Dr. B. laid his hand on his heart, and Mr. S. held a clean looking-glass to his mouth. I found his pulse sink gradually, until at last I could not feel any by the most exact and nice touch. Dr. Baynard could not feel the least motion in his heart, nor Mr. Skrine perceive the least soil of breath upon the bright mirror which he held to his mouth. Then each of us by turn, examined his arm, heart, and breath ; but could not, by the nicest scrutiny, discover the least symptom of life in him. We reasoned a long time about this odd appearance, as well as we could, and all of us judging it inexplicable and unaccountable ; and finding he still continued in that condition, we began to conclude indeed, that he had carried the experiment too far ; and at last were satisfied that he was actually dead, and were just ready to leave him. This continued about half an hour, by nine o'clock in the morning in autumn. As we were going away, we observed some motion about the body, and upon examination, found his pulse and the motion of his heart gradually returning ; he began to breathe gently and speak softly. We were all astonished to the last degree, at this unexpected change, and, after some conversation with him and among ourselves, went away fully satisfied as to all the particulars of this fact ; but

confounded and puzzled, and not able to form any rational scheme that might account for it.

"He afterwards called for his attorney, added a codicil to his will, settled legacies on his servants, received the sacrament, and calmly and composedly expired, about five or six o'clock that evening."

On a post-mortem examination of the body, nothing was discovered to account for the very extraordinary faculty possessed by this individual.

In this case, it must be acknowledged, we have an example of resuscitation from apparent death, and, what is still more remarkable, a spontaneous resuscitation. The semblance of death, however, was entirely due to the arrest of the circulation,—it might be regarded, indeed, as a voluntary syncope. But even in this very rare condition of the body, life could not be long maintained; a reaction was observed, after a comparatively short interval, and if a reaction had not taken place within the period stated, death would probably have followed. Besides, from the report of the case, there is reason to believe that the action of the heart, did not entirely cease; since this organ may continue to pulsate feebly and slowly at intervals, without producing any impression on the parietes of the thorax sensible to the fingers, and, certainly, without giving rise to pulsation at the wrist. The soiling of a mirror by the breath, might be prevented by many circumstances, and, therefore, this is to be regarded as a somewhat fallacious sign of the absolute cessation of the respiratory process. Such a case cannot possibly lead to ambiguity in deciding on the reality of death; because, unless the body lose its heat, and the muscular system become rigid, after the cessation of the respiratory and circulating processes, two of the most important consequences of real death, are wanting,—a circumstance which would be sufficient to inspire caution in the most ignorant and unreflecting person. There is, however, a condition of the animal body, in which we have not merely a cessation of these two important functions, but an absolute and entire suspension of all vital phenomena,—I allude to the state of hibernation

or winter-sleep of many of the mammalia. An animal in this state, appears really dead, and, if we judged of death by any sign, except that derived from the presence of putrefaction, we should at once pronounce the hibernating animal to be dead. Its body appears destitute of all vital action,—its temperature rises and falls with that of the medium in which it is immersed,—its respiration is arrested, which is proved by the fact, that the hibernating animal may be introduced into a jar of carbonic acid gas, or kept under water for a considerable period, without suffering the least inconvenience; whereas, if introduced while in the active state, and kept only a few minutes, it would be infallibly destroyed. There is no appearance of circulation, although, according to Dr. Hall, there is a feeble action of the heart, which, however, he admits, would pass altogether unnoticed by the casual observer.

It is scarcely necessary to remark, that the wide difference which exists, physiologically speaking, between man and those of the mammalia that are subject to hibernation, will not allow of any analogical application of these facts to the state of apparent death. In these animals, a final purpose is answered by their being made subject to this winter-sleep; but in man there is no such final cause in operation, and the very perfection of his organization, proves that such a state is incompatible with the continuance of his existence. But even in the hibernating animal, the absence of the putrefactive process, and the susceptibility of being roused by a very slight cause, are facts which shew that it is still endowed with life. We may, therefore, dismiss the consideration of this sign of death by observing, that when it is proved, that respiration and circulation have ceased for a certain interval, the length of which, although short, the present state of our knowledge does not allow us clearly to define, we may infer that life is irrecoverably lost. If cases are stated to have occurred where life has continued, notwithstanding the cessation of these important processes, we may presume that there has been some want of correct observation on the part of the reporters of such cases, and since many might be deceived in forming an opinion on

this subject, it is of course proper to wait for the development of the other signs of death, before the body is allowed to be interred.

Seventhly. *Putrefaction*. The accession of the process of putrefaction, is allowed by all to be an unequivocal evidence of death. Winslow and Bruhier contended, that it was the only sign of dissolution, upon which any reliance ought to be placed by the medical inquirer; but they still doubted whether mistakes might not occur, where the decision was left to the ordinary observer. Those medical jurists, who have adopted the views of these writers, remark that we can neither rely upon the effluvia given off by a part of the body in a state of decomposition, nor upon the change of colour which it undergoes. These phenomena, they state, are by no means incompatible with the presence of life in a part,—for proofs of which, they refer to the ecchymosis sometimes observed in certain fevers, and to gangrene of the extremities. It will be seen, from the description to be presently given, of the changes which accompany putrefaction, that there is no condition of the living body, which can be mistaken for that of the dead, in which this process has commenced. It is impossible to imagine, that so great an ignorance can exist upon the common and well-known consequences of death, as that a living body, in which there are simply ecchymoses, or a partial gangrene of the extremities, should be pronounced dead.

A knowledge of the changes which are consequent on the access of this process, will often be demanded of the practitioner. It may sometimes be necessary for him to determine, from an inspection of the body, the period at which death probably took place; on other occasions, he may be required to discriminate between the marks resulting from violence, and those appearances which are simply owing to the spontaneous changes that the body undergoes in death.

Putrefaction has been defined the opposite of vitality. The influence of a vital power, is certainly, under no circumstances, so strongly manifested, as in the preservation of the decomposable materials of which a living body is formed

from those changes which they have so strong a tendency to undergo. Let life be taken away from a part, and in the course of a very short period, the few simple elements of which the living matter is constituted, will begin to react upon each other,—they will enter into a new order of combination, and this internal and spontaneous reaction will not cease until the compounds produced are precisely similar to those which we meet with in inorganic nature. In a living being, therefore, the material elements are united together by a peculiar and incomprehensible force,—by a species of chemical agency which is altogether opposed to what are termed the common laws of chemical affinity. It is only in death, when this force is lost, that these elements combine together according to laws with which we are acquainted.

This process generally commences as soon as the coagulation of the blood and the rigidity of the muscular system have ceased.¹ The soft parts of the body become gradually relaxed, and feel as if they were impregnated with fluid matter. A faint odour is at the same time exhaled from the surface, and in consequence of the evaporation which is continually going on, the body slowly loses weight. The blood and the secretions now become altered in colour: they transude through the parietes of the vessels and cavities in which they are contained; while the parts which thus become infiltrated acquire peculiar colours. Owing to this infiltration, the course of the superficial veins, becomes accurately traced out upon the cutaneous surface; and, internally, those parts which are in contact with each other, will often acquire very apparent discolourations. Thus it is, that the peritoneal covering of the stomach and intestines, is often strongly marked in this first stage of decomposition, where it may have lain in contact with the spleen, liver, or gall-bladder. The red, brown, blue, or green coloured appearance of the skin, is to be attributed to the various degrees of decomposition, which these liquids undergo when infiltrated in the cellular tissue. The aqueous parts of the

¹ BÉCLARD. *Anatomie Générale*, p. 127. FOURCROY. *Système des Connoissances Chimiques*. Tome IX.

humours of the eye begin at a very early period to transude, and, hence, arises the collapsed and dull appearance of the cornea. At this time, the muscles, according to the observations of some physiologists, have the power of reddening litmus paper, proving that a free acid is generated. In some instances, and especially after a violent death, as by drowning, a large quantity of gas is generated, which collects within the serous cavities, and is commonly remarkable by its causing a considerable distension of the parietes of the abdomen. It is chiefly owing to the retention of this gas within the abdominal cavity, that the bodies of the drowned acquire buoyancy, and, after a certain period, rise to the surface of the water. In all cases where the distension of the abdomen is very great, the diaphragm becomes pushed upwards;—the blood is forced towards the neck and head: the face becomes tumid, the eyes prominent, and a mucous fluid issues from the mouth and nostrils. Sometimes, even the contents of the viscera, may become discharged by their natural outlets. If there should be any open wound, from which blood had issued during life, the action of the confined air on the circulating organs, may be such as to cause this fluid again to flow. To this latter circumstance, much importance was attached in former times; for a question of supposed murder was often summarily decided by the fact of blood flowing from a wounded corpse, on the touch of the accused party.

Putrefaction commonly commences in the abdomen, probably on account of the abundance of excrementitious matters in a semi-decomposed state, collected within the viscera. Of all the organs of the body, it first attacks those which are the most impregnated with liquid matter, as the brain and the eye. If any of the organs be altered by disease, or have been affected by any violence, previously to death, they are, *cæteris paribus*, among the first to be attacked by this process. As putrefaction advances, the epidermis becomes detached, the muscles become viscid and pulpy,—they acquire a dark greenish colour, and, at the same time, exhale a highly offensive odour. Finally, the whole texture of the body becomes changed into a soft semi-

fluid mass. This loses its moisture by evaporation; it dries up, and forms a fibrous fatty residue, which slowly becomes lost in the mould in which the body was deposited. The bones, which withstand these putrefactive changes longer than any of the other parts, gradually lose their animal matter, and, after a long course of years, fall into a loose calcareous dust.

When the body is placed under the conditions favourable to the establishment of the process of putrefaction, and when death has been caused by certain diseases, it commences very speedily, and runs through its stages with great rapidity. If these conditions be wanting, it takes place slowly, and is often not completed for many years. It has been uniformly observed, that, when it has once commenced in a body, it goes on rapidly, so that, it would appear, the resulting products have the power of exciting a similar reaction in those parts which have not yet experienced any change. There are many causes which may suspend or modify its accompanying phenomena; and to these, therefore, we will now proceed to direct our attention.

In order that putrefaction should take place, it is necessary that the body should be exposed to a certain temperature, and that it should be impregnated with moisture. The atmospheric air also assists in the continuance of the process, but it does not appear to be absolutely necessary to its establishment; its influence is chiefly confined to the rapidity with which putrefaction advances, and to the nature of the changes which ensue.

First. Temperature. A temperature varying from 70° to 100° is found to be most favourable to the commencement of putrefaction. It may take place, all other circumstances concurring, at any temperature above 50°; but at 32° it is wholly arrested. The influence of temperature on putrefaction is seen in the rapidity with which the process goes on during the summer, compared with the slowness of its progress during winter. In those situations where the thermometer rarely rises above the freezing point, putrefactive decomposition is not observed, but the body gradually becomes dried up, and, in this state, it may remain for years without change.

Secondly. *The presence of moisture.* It is certain, that, unless water be present, the putrefactive process will not commence; or, if it has commenced, it will not continue. The water naturally contained within the organs of the body is sufficient to ensure their speedy decomposition, provided other circumstances be favourable. It has been already observed, that those parts of the body which are the most impregnated with water are the most prone to putrefaction; and it must therefore follow, that those parts which contain the least portion of liquid matter will resist this process for a very long period. In this respect, the brain and the eye are contrasted with the osseous parts of the body. If we drive off the water from any substance which is prone to putrefaction, it will not putrefy, although exposed to a sufficient temperature, and to the free access of air. Again, if the air be thoroughly dry, putrefaction will not readily take place, because the moisture which the body contains becomes thereby rapidly abstracted. Owing to this circumstance, the bodies of travellers which have lain exposed in the deserts of Africa have been discovered perfectly preserved, some years after their disappearance. A rapid current of air, although the air be not absolutely dry, will also retard putrefaction, because it will increase the evaporation from the body. Hence it will follow, that a stagnant and a humid atmosphere must be, *cæteris paribus*, extremely favourable to putrefaction.

Thirdly. *Access of air.* Air appears to be necessary to the continuance of the putrefactive process, merely in consequence of its surrendering its oxygen, to combine with the elements of the animal body; for it has been shewn, by experiment, that all those gases which are destitute of free oxygen retard the process. There is no doubt, however, that, provided the two first conditions for putrefaction exist, the process will commence, and will continue, although perhaps slowly, independently of all atmospheric influence. From the very great tendency which the elements of animal matter have to form new combinations, where life is extinct, a spontaneous re-action may commence somewhat analogous to that which is termed fermentation in vegetable products,

but which differs from fermentation in the nature of its results. Thus hydrogen and carbonic acid gases, although they can have no chemical influence on the process, retard, but do not entirely prevent its taking place. In these remarks, relative to the influence of air on putrefaction, it must be remembered that we are treating of its action, independently of its dry or humid condition, and of its being in a state of rest or motion.

These, then, may be considered the three principal conditions which influence the access, duration, and rapidity of the process of putrefaction. Without the existence of at least two of these, namely, *heat* and *moisture*, a dead body will not decompose. But there are many subordinate circumstances, which, although not essential to the process, have a very decided influence on its progress; and a knowledge of these will be found of importance to the medical jurist, in medico-legal investigations, relative to the exhumation of the dead.

We are chiefly indebted to the researches of Orfila for all that is known of this part of the subject, and the following remarks may be considered as embodying the results of the very numerous experiments performed by that physiologist, relative to the decomposition of the body, when buried under ordinary circumstances, in the soil.

I. *Age*. The bodies of infants decompose with much greater rapidity, *cæteris paribus*, than those of adults and aged persons. In a question of infanticide, where the body of the child is exhumed, it may be often necessary to determine the probable period at which it was buried. Unless a medical practitioner were acquainted with the influence of age on the progress of putrefaction, he might, in such a case, be led to pronounce, that a child had been dead and buried a much longer period than it really had. The body of a very old person will decompose more rapidly than that of an adult, all other circumstances being equal.

II. *Sex*. Putrefaction will take place more rapidly in the female than in the male subject. Orfila attributes this difference to the larger quantity of adipose matter contained in the subcutaneous cellular tissue of the female; but this

scarcely appears to be a satisfactory explanation of the difference.

III. *Peculiarity of constitution.* Orfila suggests that the state of the constitution may influence the phenomena of decomposition; but he adduces no facts in support of his opinion. He attributes this influence, in many instances, to the very variable quantity of liquid matter contained in different subjects. It may certainly appear difficult to understand how a difference in constitution, during life, can retard or accelerate the progress of putrefaction in a body after death; but, during the prevalence of epidemic diseases, facts frequently present themselves, which seem inexplicable upon any other supposition. Thus death may take place, about the same time, from the same cause, in two individuals of the same age and sex; and yet it will be frequently observed that putrefaction advances with very different degrees of rapidity in the two subjects, although they are exposed under precisely similar circumstances. This difference may be, in some cases, so striking, that one of the subjects will be in an extreme state of decomposition, while the process will hardly have commenced in the other.

IV. The putrefactive process varies according to whether *the body be fat or emaciated.* Those subjects which are loaded with adipose matter putrefy much more readily than those which are thin and emaciated. This is somewhat extraordinary, since, of all animal proximate principles, the fat or oil, probably from its not containing nitrogen, appears to be the least prone to decomposition. There is a peculiarity to be observed in the changes which these subjects undergo. When exposed under circumstances favourable to the process, as in a damp grave or vault, the fat becomes slowly converted into the margaric and oleic acids, which, uniting with the ammonia generated during the decomposition of the muscular fibre, form a species of animal soap. This substance is of a yellowish white colour, and has the physical characters of a compound of wax and fat, from which circumstance it has acquired the name of adipocere. The formation of adipocere will be more fully explained, when we speak of the decomposition of the body in water.

V. There will also be a difference in this process, according to whether *the body be mutilated or entire*. Those parts which are affected, at the time of death, by contusions, ecchymoses, or extravasations of blood, become much more speedily decomposed than those parts which are in a normal condition. If there be any solution of continuity or loss of substance accompanying these extravasations, the effect will be much more strongly marked. This it is important to bear in mind, because, when the body of an individual who is suspected to have died from external violence, is not seen until some time after dissolution, the injuries will appear to be of a much more aggravated nature, than they ought to be considered by the medical jurist. A want of attention to this point might be the means of involving an accused party in a charge of manslaughter or murder, when death had really proceeded from some other cause. That a subject which is mutilated will decompose more rapidly than one which is entire, must be well known to anatomists. In some experiments, which I performed at the hospital of La Pitié, in Paris, a few years since, to determine this point, a result confirmatory of this statement, was invariably obtained. On one occasion, two recent subjects were selected, and incisions were made in the thighs of one of these, for the purpose of securing the femoral arteries. The other subject was left untouched. In the course of twenty-four hours putrefaction had advanced to a very considerable extent in the subject which had been operated on; the process appeared to have commenced at the edges of the wounds, where it was most strongly marked, and to have thence spread over the whole of the lower extremities. The other subject, which was entire, presented scarcely any traces of decomposition,—at least the lower extremities preserved the appearance which they had the previous day. This experiment was performed during the height of summer, in a close and stagnant atmosphere, and, consequently, under circumstances in every way favourable to putrefaction. Although the fact here mentioned, may appear of slight importance, it is necessary that a practical application of the conclusion to which it leads should be made in the post-mortem examination of bodies, where the individual has died

while labouring under the effects of external violence, and where the body is not examined until after the lapse of some hours from the time of dissolution. Unless the practitioner attend to this, he may unknowingly exaggerate the degree and effects of the violence inflicted on the person of the deceased.

VI. *Nature and duration of the disease which has caused death.* Putrefaction goes on in general with greater rapidity in the bodies of those who have died of acute, than in those who have died of chronic diseases. The body of one who has died from asphyxia, according to the observations of Orfila, putrefies much more rapidly than the body of an individual who has died from hemorrhage, all other circumstances being equal. The distension of the venous system with blood in the asphyxiated subject, and the facility with which this fluid decomposes, are facts which may probably suffice to explain the difference observed. When death is a result of anasarca or small-pox, putrefaction, *cæteris paribus*, commences much sooner, and advances with greater rapidity, in the same period of time, than when death takes place from some cause unconnected with extensive disease. The same observation has been made in regard to the bodies of those who have died of typhus or other adynamic fevers; but this statement requires to be corroborated. In all cases, those parts of the body which are in a state of irritation, inflammation, or congestion, at the time of death, become, *cæteris paribus*, speedily decomposed.

VII. *Certain circumstances accompanying the death of the individual*, may influence its progress. Thus, variations are met with according to whether death has taken place slowly or suddenly;—whether the system has been exhausted by long suffering or not. The introduction of certain organic poisons into the circulation, is said to have a remarkable effect in accelerating putrefaction. When death takes place in consequence of the poisoned wounds which result from the bites of certain venomous ophidia, of tropical regions, the process of decomposition has been stated to follow with great rapidity; but, in making these observations, it is probable that sufficient attention has not been paid to the com-

bined influence of numerous other existing causes. Some toxicologists have remarked, that putrefaction soon manifests itself in the bodies of those who have perished in consequence of eating many varieties of the poisonous fungi.

But a few years since, the rapid access of putrefaction, in a body suspected to have been poisoned, was considered as *prima-facie* evidence of poisoning; and on a celebrated trial for murder, which took place in 1808, the chief medical witness for the defence, adduced the circumstance of the absence of putrefaction in the body of the deceased, as a negative proof that death had not taken place by poison.¹ Whatever effect organic poisons may be allowed to have in accelerating this process, it is quite certain that no such power is possessed by any of those belonging to the mineral kingdom. On the contrary, very numerous observations, recently made in this country and on the continent, have tended to shew that the effect of the most important of the mineral poisons,—arsenic, is the reverse of that which was formerly attributed to it. So far from accelerating putrefaction, it is proved to possess decidedly antiseptic properties, and, on more than one occasion, it has been discovered, on the exhumation of bodies in which arsenic was present, that while putrefaction had advanced throughout the body to such an extent, as to render the organic structure of parts no longer recognizable,—the stomach and the viscera which contained the poison, were sufficiently preserved, to enable the examiner readily to identify them. It may suffice to remark, that the opinion to which we have referred respecting the rapid progress of putrefaction in the body of an individual who has died from mineral poison, is now chiefly confined to the vulgar. No well-informed practitioner, would look upon it, as affording the least ground of presumptive evidence in a question of poisoning.

VIII. *Period of interment.* It is well ascertained, that a body putrefies much more rapidly in air, than in any other medium; hence, if it be kept long exposed before it is

¹ Evidence on the trial of Angus for the murder of Miss Burns. PARIS and FONBLANQUE. Med. Jurisprudence. Vol. II, p. 184.

interred, putrefaction will take place much more readily, and advance to a much greater extent, than if it be buried very soon after dissolution. On this subject, Orfila remarks, that, if during the summer, a body be kept exposed for five or six days, and then interred,—it may be found on exhumation after the lapse of a month, that putrefaction is as far advanced, as it would have been after the lapse of seven months, supposing that the subject had been interred within a few hours after dissolution. It has been already stated, that the period at which cadaverous rigidity of the muscular system ceases, is that at which putrefaction may be considered to commence. Many circumstances have been already pointed out, which retard or accelerate the access of this condition of the body. When cadaverous rigidity has been retarded by any of the casual circumstances mentioned, as by wrapping the subject in flannel or linen, the putrefactive process will necessarily be a longer time in making its appearance. When the rigidity is a speedy consequence of dissolution, we may expect that putrefaction will rapidly take place.

IX. *Deposition of ova by insects.* According to Orfila, there are no less than twenty species of insects which deposit their ova on the surface of the dead body; and the larvæ produced from these ova, rapidly assist in the decomposition and entire destruction of parts. Among these, the *musca tachina simplex* and *carnaria* may be particularly mentioned. For a short period after death, flies and other insects, even those of a parasitic kind, seem to avoid the body: they rarely approach it or deposit their ova upon it, until putrefaction has commenced. When these ova are once deposited, larvæ are very speedily produced from them, and decomposition now rapidly advances. The development of these insects commonly takes place with such rapidity, that the surface of the body as well as the outlets, if the temperature of the atmosphere be at all high, become very soon covered with ova and larvæ. It is obvious that the development of many thousands of these ova may not take place, until the body is placed within the grave; and it is certain, that, when interred under these circumstances, it will be found, on exhumation after a given time, to have run through the different stages

of decomposition with much greater rapidity, than a subject, the interment of which took place before any ova were deposited. Admitting the correctness of these observations, the medical jurist may expect to find that a subject, interred during the summer, will, after a given time, have advanced to a greater degree of putrefaction, than one which was interred during the winter, all other circumstances being equal.

There is one remarkable circumstance connected with the history of these insects, which, if the observations of Orfila be correct, must be considered difficult of explanation. This physiologist remarked on the exhumation of bodies which had been interred at all seasons of the year, that larvæ, nymphæ, and insects in the perfect state, were uniformly met with,—especially of that species denominated *musca tachina simplex*. The subjects had been interred in some instances, for many months, in others for several years; and, generally, at the depth of from four to six feet in the soil. It is scarcely possible to admit that these larvæ and insects had resulted from ova, deposited on the body about the time of interment, which had remained dormant, or, as it were in a state of hybernation for so long a period, because many of the subjects died and were interred during the winter, a season when these insects are not met with in the atmosphere. It is equally difficult to conceive that they should find their way through the earth, to deposit their ova at so great a depth below the surface.

X. *Nature of the soil in which the interment takes place.* If the ground be elevated or on an acclivity, it will commonly be dry, and decomposition will be retarded: if the body be buried in a low situation, or in a valley, the soil being generally damp, decomposition will be hastened. A dry and absorbent soil will invariably retard putrefaction, and thus, bodies buried in the sands of Egypt, become often perfectly desiccated, and resist the process for a long series of years.

The chemical nature of the soil also, has an influence, which may be briefly stated. In sand or gravel, putrefaction goes on more slowly than in other soils, and adipocere is rarely met with. In marl or clay, the process takes place

more quickly, especially in loose mould or in any soil much impregnated with animal or vegetable matter. It is in these last-mentioned soils, provided they be not too dry, that the formation of adipocere is most abundant; and it is important to observe, that, however great the rapidity with which putrefaction may have advanced previously, it is invariably suspended on the occurrence of this process of saponification. By a reference to the nature of the soil, therefore, we may often explain why a subject, after having been interred for a considerable number of years, will be exhumed apparently unaltered by decomposition. The whole of the soft parts will be converted into this saponaceous substance; but although the physical outline may be preserved, there will be no trace of texture perceptible internally.

XI. *The depth of the grave.* The experiments performed by Orfila, clearly shew, that the deeper the grave, *cæteris paribus*, the longer putrefaction is retarded. This may depend upon two circumstances: I. upon the want of a free access of air; and II. upon the uniformly low temperature which is known to prevail at all seasons of the year, at a certain depth below the surface of the soil.

XII. *The state in which the body is buried.* It has been observed, that when the body is in close contact with the earth, as where it is thrown into the grave naked, putrefaction will take place more readily than when it is buried loosely covered by clothes. The process is retarded, if the body be buried in a coffin, and the material of which this coffin is made, will have an influence which requires to be noticed. Thus in a leaden coffin, if the metal be of some thickness, and the coffin be hermetically sealed, the ordinary putrefactive changes will become very speedily arrested, while in a wooden coffin, the preservative influence is but slight,—the wood itself being subject to decomposition.¹

¹ For a more copious account of the phenomena of putrefaction, I must refer the reader to ORFILA'S *Traité des Exhumations Juridiques*. The perseverance and industry displayed by this writer, in his researches on a subject so little known and understood, are worthy of all praise. The mode in which he has treated it, offers a bright example for imitation, to all those who are devoting themselves to the study of Medical Jurisprudence.

From the relation of all these facts, connected with the history of the destruction of the human body by the process of putrefaction, we may perceive how difficult it is to generalize upon phenomena, the nature, progress, and duration of which, are liable to be modified by so many incidental causes.

It is commonly stated, that the soft parts of the body become entirely destroyed in from four to six years after interment, and the hard parts in about thirty years: but such statements are not to be relied on, as data for forming an opinion in medico-legal investigations relative to the dead. The medical jurist must make an accurate estimate of all the circumstances to which the subject has been exposed, and it is only upon the conclusions obtained from a combination of these, that he will most securely base his decision.

These, then, may be considered the changes which a body undergoes in real death: and setting aside the phenomena of putrefaction, which are allowed by all to establish the reality of death, it will be merely necessary to consider, in concluding this chapter, whether a living body can, under any circumstances, present the different conditions which have been enumerated as characteristic of death. Under each sign, the objections raised to its validity, by certain writers, have been brought forward and answered. Our task, therefore, becomes easy; for, assuredly, if in the presence of one sign, we have a probability, we may affirm that, in the presence of all, we have the strongest certainty. It is very singular it did not occur to the writers so frequently alluded to, that to have established the uncertainty of the signs of death, they should have brought forward a case wherein not one merely, but all the signs of death, were present,—the individual being at the time really living, and becoming subsequently resuscitated. No case of this kind having the smallest claims to credibility, has been reported; and, although it is not often that we are justified in speaking of the impossibility of things, a rational mind cannot avoid drawing the conclusion, that such a case could not occur, unless through the aid of miraculous agency. If,

therefore, a body be in a state of insensibility and immobility,—if the skin become gradually cold and lose its elasticity,—if, in proportion as this cooling process advances, the muscles of the trunk and limbs become rigid,—if this rigidity in the course of some hours gradually disappear, and, during the whole of this time, there be not the smallest perceptible sign of the existence of respiration and circulation, we may safely affirm, without waiting for the occurrence of putrefaction, that death is real; for to presume that the animating principle can again return to a body which has undergone these successive changes, is equal to supposing that the certainty of an event is never to be acquired by human experience. It is useless to observe, that no sign of death is to be separately relied on, for the most ignorant and uninformed individual would not consign a human body to immediate interment, merely because it was cold, or rigid, or insensible;—he would found his judgment not upon one circumstance, but upon a combination of the whole of those circumstances, which the general experience of mankind has taught us to regard as evidences of death.

That the access of putrefaction is an indisputable indication of death, has not been denied; but there are many occasions on which it will not be proper for the safety of the living, to wait for the perfect development of this process. This may be especially the case during the prevalence of contagious epidemics, attended with great mortality. At the time that the malignant cholera was so fatally prevalent in this country, the bodies of those who died of that disease, were ordered to be interred within twenty-four hours from the time of death. In many of these cases, interments must have taken place before putrefaction had manifested itself; for there is no specific time at which this sign of dissolution commences. The question, therefore, on such occasions is, whether there be any other facts upon which the reality of death in an individual lying apparently dead, may be infallibly determined, prior to the decomposition of the body. The answer is simple,—we may rely upon the cooling of the body, accompanied by rigidity of

H

the muscular system, gradually extending over the members and trunk :—no further evidence need be sought for. At the same time, it would be highly improper to inter a body until this evidence had been obtained; and, as the period at which these signs of death may manifest themselves, is subject to variation according to circumstances, so is it impossible to specify the exact time within which a body may be safely buried. Twenty-four hours would in general suffice for the development of these signs; but if, during that time, the body should not undergo the changes mentioned, the interment ought to be deferred. The danger which would result to the living, from the exposure of the body, if, as it probably might occur, it were really dead, cannot be balanced against the dreadful alternative of possibly consigning a fellow-creature still endowed with life, and capable of resuscitation, to the inevitable fate which would await him in the tomb.

CHAPTER III.

DEATH BY DROWNING.

I. Cause of Death in drowning,—death owing to the non-renewal of air in the air-cells,—Drowning a form of death by asphyxia,—death sometimes a consequence of syncope. II. Time required for death to take place by drowning,—fabulous statements of the older writers,—modern opinions on the subject. III. Post-mortem appearances in the bodies of the drowned,—external appearances,—fluidity of the blood,—fulness of the cerebral vessels,—state of the abdominal and thoracic viscera,—To determine whether death took place by drowning or not,—evidence from external appearances,—from the state of the internal organs,—from the presence of water in the stomach,—from its absence,—evidence from the existence of a mucous froth in the trachea,—of water in the lungs. IV. Marks of violence on the drowned,—Wilkinson's case,—Carwardine's case,—Lumsden's case.—Whether the drowning be the result of accident, suicide, or homicide,—Martin's case,—case of Sarah Stout, 1699. V. Buoyancy of the body in water,—case of Admiral Carraccioli. VI. Putrefaction in water.

We have already anticipated a description of the phenomena of death by drowning in treating of asphyxia; but since various opinions have been brought forward on trials respecting the real cause of death in drowning, it will be necessary, before proceeding to the medico-legal history of the subject, to call the attention of the reader to a few of the hypotheses which were entertained by the older physiologists.

I. *The cause of death.* Since water was frequently found in the stomach of a drowned person, it was considered that this liquid might, by its presence in the viscera in any quantity, operate as the immediate cause of death. This unfounded notion prevailed before the importance of the

respiratory process in the economy was fully understood. It would, however, have been easy to have shewn the inefficiency of this explanation, by a simple appeal to facts. Water is not invariably found in the stomachs of the drowned, and again, it may be introduced into the stomach in much larger quantity, than we are accustomed to meet with it in the body of a drowned person, without producing any deleterious effect. The presence of water in the bronchial ramifications of the lungs, has been also suggested as the probable cause of death,—this was the opinion of Larrey; and De Haen, who adopted the same view, thought that the water thus introduced, operated by arresting the circulation of the blood in the minute pulmonary vessels. This explanation of the cause of death in drowning, would imply that water was always present in the lungs of the drowned, which, however, is not the case, and, indeed, when found, it is often met with in very variable quantity,—facts which sufficiently shew that the hypothesis of De Haen cannot be entertained. Several physiologists, who have devoted considerable attention to the subject, have endeavoured to disprove De Haen's views by direct experiment. Among others, Goodwyn adopted the following means to shew the inadequacy of this explanation. Having made an incision into the trachea of a cat, he gradually introduced two ounces of water into its lungs: the animal appeared to suffer from difficulty of breathing, but it lived several hours, and was finally strangled, when a certain quantity of water was found in the bronchiæ.¹ Similar experiments have been performed by Gardanne and Varnier on dogs and rabbits, and the general conclusion from these, is, that the introduction of water into the lungs, is not immediately or necessarily fatal to life. Orfila considers that this conclusion has been somewhat hastily drawn, since he contends, the animals, in these experiments, were not placed under the same circumstances that they would have been, in the act of drowning.² It must be remembered,

¹ Médecine Légale. Tome II. p. 281.

² On the connection of Life with Respiration.

however, that the object of the experimentalists was to shew that water could not of itself arrest the pulmonary circulation, and thereby cause death; and in this point of view the results of these experiments may be considered perfectly satisfactory and conclusive.

Death has been attributed to a collapse of the lungs, by which the blood is presumed to be mechanically prevented from traversing the pulmonary structure. It is a generally admitted fact, that a considerable quantity of air is, in most cases, expelled from the lungs during the act of drowning. This has been more particularly observed by Coleman, Berger, and Dr. Edwards. Berger remarks, that nearly all animals, in drowning, after having been about a minute and a half in the water, expel the air contained within the lungs. These observations may be perfectly correct, but it is certain that the lungs are not found invariably collapsed in drowned animals,—indeed, so far is this from being the case, that it is commonly difficult to determine whether these organs be more collapsed in this, than in most other kinds of death. We may allow that the pulmonary circulation becomes really arrested, but the arrest of this function is not the immediate cause of death, for the fatal influence of the medium in which the animal is immersed, becomes manifested before the circulation ceases. The collapsed state of the lungs, therefore, when observed, is rather to be regarded in these cases as a consequence, than as a cause of death.

Some have ascribed death in drowning to a congested state of the cerebral vessels,—in other words, they conceive that death takes place in most cases by a species of apoplexy. Such was the opinion of M. Hopfenstock,¹ and such also appears to be the view entertained by M. Marc.² That a congested state of the cerebral vessels, is often met with in the bodies of the drowned, is a fact which cannot be disputed; but the same degree of congestion is observed, not only in other cases of asphyxia, where no idea of death

¹ MAHON. Méd. Lég. Vol. III. p. 28.

² Mémoire sur les moyens de constater la mort par submersion.

by apoplexy would be entertained ; but also in the inspection of bodies where death has proceeded from various causes, unconnected with cerebral disturbance. There is no ground, therefore, for attributing death to an apoplectic attack ;— a mere fulness of the cerebral vessels, is certainly insufficient to afford any evidence in favour of this view, for upon the same evidence, we might pronounce three-fourths of those deaths which are distinctly referable to other causes, to be dependant on apoplexy. The obstruction to the passage of the blood through the lungs, is sufficient to explain why we meet with a sanguineous congestion in the cerebral vessels of drowned subjects; and there is great reason to believe that the occurrence of this congestion, is posterior to the interruption of the cerebral functions.

According to Macquer, the cause of death in drowning, is owing to the deleterious alteration which the air contained within the lungs, undergoes when it is not subject to renewal. Berger states that the air, expelled from the lungs of a drowning animal, will be found to have lost from fifteen to sixteen per cent. of its oxygen, and to have acquired about that degree of contamination which is observed to exist in an atmosphere in which respiration has been carried on until asphyxia is induced: but whether the change take place in the air of the pulmonary cells to the extent indicated by Berger or not, is a point which still remains open to dispute. According to this view of the cause of death, an animal, in drowning, perishes in consequence of the noxious properties of the air contained within its lungs,—but unless we pursued the explanation further, we should have but an imperfect idea of the subject.

In representing the air of the air-cells as exerting a noxious influence, we are assigning a remote cause for a phenomenon which is capable of being explained without much circumlocution. It is owing to the non-renewal of the air, that the animal dies, and not to any deleterious influence of that air which is contained within its lungs at the time of submersion. That this is the true cause of death, and that water acts indirectly by excluding the atmospheric air from the lungs, has been clearly proved by an experiment of

M. Gauteron's. This physiologist having secured a dog, for the purposes of the experiment, made an opening into the trachea, into which he introduced the extremity of a long tube. The animal was now forcibly retained, at some depth under water, the end of the tube being carefully kept above the surface. In this situation the animal remained for upwards of a quarter of an hour, respiring freely through the tube, and at the termination of the experiment, it was found to have sustained no injury.

Asphyxia is induced in drowning, owing to a physical impediment to the introduction of air, and we have, therefore, in this form of death, a simple illustration of that state. The medium in which the individual is immersed, acts mechanically and as effectually, as a rope or ligature around the neck; for although air escapes from the lungs, and water penetrates into the bronchiæ, yet no air can enter, to supply the place of that which has already expended a certain quantity of its oxygen on the blood. Hence this fluid must circulate in a state unfitted for the support of existence, and death will ensue, accompanied by the phenomena already described. Some physiologists, it may be observed, have not been content in referring the cause of death simply to asphyxia,—they have considered that those who were submerged while living, frequently perished by syncope, and often by what is termed syncopal asphyxia. It has been supposed that the state of terror into which an individual may be thrown prior to submersion, would be sufficient to bring on syncope, and this, it was presumed, offered an adequate explanation of the recovery of the apparently drowned, where the body had remained a long time in water. We may readily admit, that, in some instances, the mental shock may be so great to a person falling into water, as to induce syncope: but it is impossible to determine how often this occurs, and its occurrence appears to be founded rather upon presumption, than upon actual observation.

The existence of the state denominated syncopal asphyxia, is problematical; for it is not easy to understand how syncope and asphyxia should coexist, much less how a state

compounded of the two, should be the proximate cause of death in drowning. M. Marc divides the asphyxia produced in drowning into four species: the differences between these he makes chiefly to consist in the entrance or non-entrance of water into the trachea,—in the total suspension of the heart's action at the moment of immersion, through nervous susceptibility,—and in the presence or absence of cerebral congestion. It is scarcely necessary to remark, that these divisions of asphyxia, are merely descriptions of modifying circumstances, which have been long known to accompany the act of drowning.

II. *The time required for death to take place by drowning.* This is a very important question, and one which may be frequently put to the medical witness. If we refer to the older writers, for information on this point, we shall find the most extraordinary accounts of the resuscitation of the drowned, after a submersion of many hours, and even in some instances of days. Morgagni relates the case of a young man who was resuscitated by the simple application of stimulants to the nostrils, after having been immersed in water nearly half a day. Dr. Good, in his "*Study of Medicine*," alludes to many marvellous instances of recovery from drowning after the lapse of a considerable time, but most of these are derived from obsolete writers, and bear about the same degree of authenticity, as the particulars of the extract below.¹

¹ "There are others," says Bishop Wilkins, "who have invented ways to walk upon the water, as regularly and firmly as upon the land. There are some so accustomed to this element, that it has been almost as natural to them as to the fish; *men that could remain for above an hour together under water.* Pontanus mentions one who could swim above a hundred miles together, from one shore to another, with great speed, and at all times of the year. And it is storied of a certain young man, a *Sicilian* by birth, and a *diver* by profession, who had so continually used himself to the water, that he could not enjoy his health out of it. If at any time he staid with his friends on the land, he should be so tormented with a pain in his stomach, that he was forced for his health to return back again to Sea, wherein he kept his usual residence; and when he saw any ships, his custom was to swim to them for relief, which kind of life he continued till he was an old man and dyed." Bishop WILKINS. *Mathematical Magick*. p. 207. 1691.

A most extraordinary case of resuscitation from drowning was read a few years since before the Royal Academy of Medicine in Paris. M. Bourgeois, of Saint Denis, stated that while going over one of the bridges, he observed some persons carrying a man, just taken out of the water, to the bureau, where aid is afforded to the drowned; those who carried the body kept the feet high and the head low, and were inflicting hard blows on it with the palms of their hands. M. Bourgeois proceeded instantly to the bureau, directed the body to be placed in the horizontal posture, and began to administer assistance himself; although the man did not shew any signs of life, and had been under the water for the space of *twenty minutes*. The means used to recal life, consisted in dry frictions, in the application of stimulants, and in the injection of warm water containing salt, up the rectum and into one of the veins of the left arm. The vein on being opened, did not at first furnish any blood. Every effort appeared for a while fruitless: when, after the lapse of an hour, the flow of blood from the opened vein shewed that the circulation had begun to re-establish itself. A ligature was immediately placed on the arm, and in a few minutes, ten ounces of blood were obtained. From that time, the circulation and respiration returned, the chest evidently shewing that the latter function was restored. But just at the moment when the symptoms of asphyxia were disappearing and restoration to life was becoming more and more evident, an attack of the most horrible convulsions and tetanus threatened the destruction of the individual. Sixteen ounces of blood were immediately drawn, and notwithstanding every effort to arrest the flow of blood, it continued to run until this convulsive state was followed by one of syncope, and afterwards of profound coma which lasted for twelve hours. On the following day, the patient was quite well. M. Bourgeois presented this fact as a fresh instance of the efficacy of the trial of means after submersion for a considerable time, and when the drowned person was apparently beyond the possibility of recovery. M. Bourgeois concludes that hopes of restoration should not

be abandoned until decomposition of the body has commenced.¹

According to Dr. Male, the longest period recorded in the Reports of the Royal Humane Society, during which an individual remained in the water without the extinction of life, is three-quarters of an hour.² They, who have given credit to the published statements respecting the great length of time which an individual may remain in water without dying, have referred for corroborative evidence to the histories related of the pearl divers, employed in the pearl fishery off the coast of Ceylon. This evidence however, altogether fails when we examine the reports of writers upon whose authority we have every reason to rely. It is true, Percival³ asserts, that these divers will remain under water in some instances five minutes without injury: but this is the longest period which he assigns, and he states that they are rarely immersed more than three or four minutes. This statement would serve but little to substantiate the veracity of the cases above alluded to, and when we refer to more recent authorities,—to those who have witnessed and not merely to those who have reported upon, the operations of the divers, we find, that their accounts, as we might *à priori* expect, directly contradict these very marvellous details. Mr. Marshall, who was for many years surgeon to the forces at Ceylon, states that, in the course of his experience, he rarely knew the submersion of any one of these divers to last longer than fifty seconds. This is about the period which the practised divers of the Archipelago and other parts of the Mediterranean, who dive for sponges, remain under water, and it is generally admitted that these are the most famous divers in Europe. Dr. Edwards⁴ also observes, that from the frequent inquiries which he has made at the Ecoles de Natation in Paris, he has satisfied himself that the most expert divers cannot remain longer than three minutes under water, and that there

¹ KAY on Asphyxia. p. 279. ² MALE'S Juridical Medicine. p. 195.

³ History of Ceylon.

⁴ De l'influence des Agens Physiques sur la Vie. p. 269.

are but very few of these, who are capable of remaining for so long a time below the surface. It is scarcely necessary to pursue this inquiry further, but we learn from the above statements—that the period, during which men, who have made the art of diving a subject of constant study and practice, can remain under water with safety to themselves, is very limited; and we may therefore be disposed to assign a much shorter period for the commencement of the phenomena of drowning in the greater number of mankind. Dr. Kay remarks that “seldom or never can a person, immersed five minutes in water, be restored to life.”¹ and Dr. Paris says, that in man, under the most favourable circumstances, it is extremely doubtful whether the heart ever continues to pulsate for so long a period as five minutes after the lungs have ceased to perform their office; and it is very questionable whether in most instances, the interval is not considerably shorter than this.²

Mahon, who believes that the difficulty of establishing the reality of death in any case, is very great, affirms that life may be maintained for some time under water without respiration; and he considers that we are not justified in regarding as apocryphal, those accounts in which the bodies of individuals are stated to have remained for a long time in this medium, and to have been subsequently resuscitated.

The insensibility which is the result of submersion, will give to a body which has been immersed only a few minutes, the characters of apparent death; but we are not, therefore, to desist from applying every means in our power to restore animation. On the contrary, it is only a proper act of humanity that these means should be applied without delay, even to subjects which have remained so long in water, as to afford, physiologically speaking, but little hope of ultimate resuscitation. A man who would neglect the application of these, would consign the body to certain death, while, by adopting an opposite course, he might, perhaps unexpectedly to himself, be the means of restoring a fellow-creature to

¹ Op. Cit. p. 137.

² PARIS and FONBLANQUE. Med. Jur. Vol. II. p. 34.

existence. Hence we are not to allow ourselves to be influenced, in the treatment of the drowned, by the shortness of the period at which death must commonly take place; for it is possible that two individuals may be drowned under the same circumstances, and treated, on removal from the water, in the same way; and yet the means of resuscitation will be effectual in one case, while they will totally fail in the other. It ought to be borne in mind, that the susceptibility to the restoration of life may be different in the two subjects: were this not the case, it would be impossible to explain why, under the most judicious treatment, every effort will fail in restoring animation in a subject which has been submerged only a few minutes, while the same means will perfectly succeed in resuscitating another subject which may have been submerged more than twice the period.

If we are called upon to state physiologically, how we can reconcile the accounts of resuscitation after the body has remained for half an hour, or even for a longer period, in water, with the fact of the occurrence of death within the short interval of a few minutes from the time of submersion, we should look upon such accounts, provided their authenticity be placed beyond all doubt, as extraordinary exceptions to a very widely-extended rule. It is necessary to observe, that the head of the subject may not have been under the water during the whole of this time; the individual may have struggled long, and have risen frequently to the surface, or the upper part of his body may have received support from some mechanical obstacle. All these circumstances, as well as the depth of the water in which the body is found, should be duly considered before we proceed to admit statements, which are opposed to facts well established by experiment and observation. In most of the cases on record, the evidence has been derived from ill-informed and ignorant persons, who were but little fitted to convey accurate information upon so important a question, and whose conjectures we should be extremely cautious in receiving. Thus, let us even take the case related by M. Bourgeois as an example of the least marvellous of these.

This gentleman states that " while passing over one of the bridges of Paris, he accidentally saw the subject who had just been taken out of the water, apparently drowned." But upon whose authority does M. Bourgeois affirm that this body had been under water for twenty minutes ? It could not have been from his own observation, as it does not appear that he was present when the accident happened : he must have made this statement solely from the reports of the by-standers. By a close cross-examination of these witnesses, it would probably have been discovered, that each would have expressed a different opinion relative to the time which had elapsed ; some would have stated it to have been ten minutes, and others an hour. This is not the description of evidence to oppose to well-established physiological facts ; and, although we agree with the reporter of the case in his conclusion, that we should continue to apply the means of resuscitation, even where our efforts may appear to be hopeless, we cannot admit that he has any right to infer from such evidence, that this drowned person had remained *entirely under water for so long a period.*

The other cases of this description, so far as I have been enabled to examine them, are based upon equally vague evidence ; but some who are better satisfied with the authorities by which these cases are attested, have endeavoured to explain them by assuming, that the individuals in question, were restored from a form of syncope, which had occurred in consequence of the mental shock experienced at the moment of submersion. It has been admitted that syncope may occur under these circumstances, and it is possible, also, that the susceptibility of resuscitation may remain longer in a subject labouring under syncope, than in one who has perished by asphyxia : but the question here obviously presents itself, whether the lungs can cease to act and the heart to circulate blood for the period of half an hour, consistently with the maintenance of life. The medical jurist must remember, that neither of these functions can continue when the body remains entirely submerged : for it is impossible that air can enter into the lungs, and we know that the circulation, provided syncope be not previously

induced, is not maintained above three or four minutes in a subject so situated. There are few indeed who would be disposed to admit, that respiration and circulation could remain so long entirely suspended in any individual whether he be in a state of syncope or asphyxia, without the complete destruction of life, or if they did admit the possible occurrence of so great a deviation from the common phenomena of vitality, they would require far better evidence for such an admission, than that by which these cases are usually supported. In numerous experiments on drowned animals, I have never found that life could be restored, after the animal had remained entirely submerged for the space of four minutes. We are then bound unhesitatingly to declare, that in drowning, life is very speedily destroyed,—that the time within which resuscitation may be successfully attempted, is subject to variation,—and, lastly, that the cases which have been hitherto recorded of restoration after the lengthened submersion of three quarters of an hour and upwards, are to be regarded as extravagant fables.

III. *Post-mortem appearances met with in the bodies of the drowned.* In conducting the examination of the body of a drowned person, it is necessary for the practitioner to remember, that the external and internal appearances will vary much, according to the time which the body may have remained in water, or the period which may have elapsed, after its removal and before it is examined. Two subjects may be taken out of water at the same time, one may be examined immediately, while the examination of the other may be deferred for several days. In these cases, the post mortem appearances will be no longer similar; and the difference will be particularly great when the last-mentioned body has been exposed to a high temperature, and to the free access of air.

Supposing that the body has remained in the water only a few hours after death, and the inspection has taken place immediately on its removal, the skin will be found cold and pallid; but in some instances livid discolourations may be observed. The face will be somewhat tumid, the eyes half open, and the pupils dilated, the mouth closed, the tongue frequently pushed

forwards to the internal edges of the lips, and these latter, together with the nostrils, covered by a mucous froth. If the body have been submerged for a longer period, or have remained long exposed before inspection, the skin will be found variously discoloured according to the degree to which putrefaction may have advanced. If three or four months have elapsed before its removal, the skin covering the legs may be, in the first instance, of a deep indigo colour: but if the body be exposed to the air, this colour gradually disappears, and the skin becomes brown.¹ The slighter degrees of discolouration of the skin, observed on the bodies of the drowned, when first removed from the water, are to be considered as resulting, according to Orfila, from the simple exposure of the body to the action of water, and not from the asphyxiated state in which the individual dies. The same discolourations, he observes, may be met with in bodies which have been thrown in after death, and have been allowed to remain a sufficient length of time.

The influence of air upon the skin of a drowned subject, is most remarkable in the face and thorax. When the body has remained for some days in water and has been exposed for a few hours only after its removal, the temperature of the atmosphere being moderately high, the face will commonly be found to have become livid and bloated, and the features will be so distorted, that they will be with difficulty recognizable. Orfila remarks in regard to this change, that it may be observed in the skin covering the thorax before it takes place in that covering the abdomen; while the contrary is generally observed in regard to those subjects where death has not taken place by drowning. The change chiefly consists in the skin becoming at first of a livid brown colour, which gradually passes into a deep green. That these effects are to be ascribed to the free contact of air, appears evident from the fact, that they are most fully developed in those parts of the body, which are the most exposed to the atmosphere. Thus, these changes

¹ ORFILA. Méd. Lég. Tome II. p. 335.

of colour in the skin, are not commonly met with where any parts of the cutaneous surface have been in close contact, as in the axillæ and inner surfaces of the upper and lower extremities, where the former have been closely applied to the sides of the trunk, and the latter have remained in close proximity to each other. For the same reason the discolouration is not commonly observed at the back of a subject, or where any part of the body has been tightly wrapped in clothes.¹

There is another external appearance which is sometimes met with in the drowned, and, therefore, requires to be mentioned, namely, the abrasion of the skin of the fingers. The older writers on Medical Jurisprudence, attributed great importance to this appearance, considering that it would suffice in many instances to solve certain legal questions relative to death by drowning. Ambrose Paré records it as a constant sign of this form of death.

It must certainly be admitted that, the fingers occasionally present these abrasions, as also that gravel, sand, or other substances may be found locked within the hands or nails of drowned subjects; for in the act of drowning, as common experience testifies, an individual will grasp at any object within his reach, and, in his efforts to extricate himself, he may excoriate or wound his fingers. There are, however, many cases of drowning, in which this sign is absent. There may be no substance for the drowning person to grasp;—this will depend in a great degree upon the fact of the water being deep or shallow, of its being confined within a narrow channel or not, and many other contingencies. In all cases, when the individual is senseless before he falls into the water, or when his death is occasioned by syncope from sudden terror, he will of course be incapable of producing those exertions, which are necessary to the production of the appearance in question.

On examining the body internally, we may expect to find in a recently drowned subject that the viscera of the thorax, will present the appearances described under the head of

¹ ORFILA. Op. cit. loc. cit.

asphyxia. The right cavities of the heart, and the vessels connected with them, are commonly distended with blood,—the lungs are sometimes found gorged, and sometimes pale and collapsed. The diaphragm, according to Hebenstreit, is pushed downwards, so as to present a convexity towards the abdomen, but this statement can scarcely have been made from actual observation. Hebenstreit seems to have given this among the appearances of drowning, in order to bear out the hypothesis which he maintained relative to the manner in which death ensued. He contended that in drowning, death took place on an inspiration, and, therefore, he supposed that the diaphragm must necessarily be pushed downwards, and remain afterwards in this position. It is needless to observe that such a condition of the diaphragm does not exist in the drowned; for it must be evident to the physiologist, that the hypothesis of Hebenstreit, is wholly unfounded.

If the subject has remained a long time in water before the inspection is made, the viscera of the thorax will be far from presenting the characters above described. Independently of the changes which may have taken place in consequence of putrefaction, the right cavities of the heart, and the vessels immediately connected with them, will be found collapsed and generally destitute of blood.

Some physiologists have asserted that the blood remains fluid in the bodies of the drowned. Orfila observes, that with one exception, he has not met with the blood in a coagulated state, in the examination of a drowned person. Probably much more importance has been attached to this appearance than it really merited. Some observers have found the blood coagulated in the drowned; and I have repeatedly seen coagula, like those usually met with after death, in the bodies of animals which were drowned for the sake of experiment. It is not difficult to understand why, in general, the blood should be found fluid, when we consider the rapidity with which putrefactive changes advance in it. Very soon after death, it coagulates,—this coagulated state continues but for a short time,—the clots again become liquefied, and in this way it is possible that

they who have observed this condition of the blood have been erroneously led to suppose that it is a constant attendant on death by drowning. Sufficient attention does not appear to have been paid to the time at which the inspection was made, or to the changes to which the body was naturally exposed. There is nothing in this kind of death, which can at all exert a counteracting influence on the coagulation of the blood,—this is proved by its being found coagulated in individuals who have certainly perished by drowning, and the fact of its having been frequently found fluid in such subjects, must be attributed to the occurrence of those accidental circumstances, which often cause it to assume this appearance in ordinary post-mortem examinations.

A greater or less fulness of the vessels of the brain is described by many authors, as one of the appearances met with in a drowned subject.¹ The vessels of the brain will be found more or less congested in many cases where death has proceeded from common causes. It is evident, therefore, that the state of these vessels can afford no presumption that death has taken place by drowning. The very vague manner in which this appearance is mentioned, proves that they who have remarked a fulness of these vessels in the drowned, must have also seen cases in which they were not more than usually congested. Orfila observes that, in his experience, he has not met with any facts which support the statements made relatively to the constant turgescence of the cerebral vessels in drowned subjects. So far was this from being the case, that he has frequently seen them collapsed and entirely destitute of blood. The evidence of this writer might be corroborated, if it were necessary, by quoting the works of other authorities, in which similar observations are recorded. In regard to the cases which I have had an opportunity of examining, the quantity of blood contained within the cerebral vessels, has rarely been so great, as to call for particular notice. It has been suggested that the position in which the body is maintained, after being withdrawn from the water, may influence the collection

¹ FODERÉ. HOPFENSTOCK. MAHON.

of blood within the interior of the cranium. When the head has been allowed to remain in a depending posture, we may expect to find the vessels in a greater state of congestion, than when the body has been reclining with the head erect. On the whole, then, this is not to be regarded as a characteristic post-mortem appearance of death by drowning. When the inspection is made soon after death, it may or may not be seen, as in other forms of asphyxia; but when any considerable delay has taken place, we must not expect to find it present.

In examining the viscera of the abdomen, it will commonly be found that the stomach contains a certain quantity of water, which appears to enter into the cavity of the organ by the act of deglutition. The quantity is subject to great variation, sometimes it is large, at other times small, and in some instances no water whatever is met with. Orfila has remarked that the alimentary canal is occasionally much discoloured in drowned subjects. He observed, also, that when drowning took place while the process of digestion was going on, the mucous membrane of the stomach often had a red or violet tint. When the drowned subject had remained a long time in the water, the lining membrane of the stomach was observed to acquire a very deep violet or brown colour. A knowledge of this fact, will be of importance in those cases, where the subject removed from the water, is suspected to have been poisoned previously to submersion.

Among the other appearances met with in the body of a recently drowned person which require to be mentioned, is the presence of a mucous froth, sometimes of a sanguineous hue, covering the lining membrane of the trachea. Water is also occasionally found in the ramifications of the bronchiæ, but in very variable quantity. If the body has remained a long time in water, or if, after removal from the water, it has remained exposed to the air several days previously to the inspection being made, there is commonly no appearance of mucous froth in the trachea or in its ramifications.

One of the most interesting, and, at the same time, the most important of the questions, which the Medical Jurist may be required to solve, relative to the subject of drowning, is the following :

Whether the individual died by drowning, or whether death took place from any other cause previously to submersion.

It is obvious that for a correct solution of this question, we shall have to consider maturely the appearances met with in the bodies of the drowned, and to determine how far they are characteristic of this form of death. The older writers appear to have had a very summary way of deciding questions of this nature. The authority of Ambrose Paré was chiefly relied on in these investigations. This celebrated surgeon laid down certain appearances of the body, as constantly existing in the drowned, which when present, were considered sufficiently striking to afford certain evidence of death having taken place by drowning, and when absent, their absence was deemed equally conclusive to establish the fact of the individual having been submerged after death. It is scarcely necessary to remark, that experience has proved the fallacy of relying upon the characters indicated by Paré, as affording exclusive evidence of drowning. Without, therefore, specially enumerating these, I shall proceed to review in succession those post-mortem appearances which have been described in the preceding pages, and endeavour to determine how far they may be applicable to the solution of the question now under consideration.

Among the *external* signs, indicative of death by drowning, where the body is seen soon after death, are the paleness of the surface and the presence of a mucous froth about the nostrils and lips. The absence of these appearances, however, would not prove that the individual had not been drowned ; for if the body has remained some time in the water, or if it has been long exposed to the air before it is seen by the medical practitioner, the cutaneous surface may have undergone various changes of colour (p. 111.) and mucous froth may no longer be seen adhering to the nostrils and lips. The situation of the discolourations when the body

is not examined until some time after death, may afford a remote presumption that the individual has been drowned. The mere paleness of the surface in a subject removed from the water, is not to be regarded as affording positive evidence of drowning, because the individual may have died previously to submersion, and yet this paleness of the skin may exist. Some Medical Jurists have considered that the presence of a mucous froth about the mouth and nostrils, is an equally ambiguous sign; but there are few conditions of the body, which can produce it previously to submersion, and it is doubtful whether the act of submersion would not cause its disappearance if it existed as a consequence of any other kind of death. Foderé¹ observes, that mucous froth is met with in the situation indicated, in apoplexy, in epilepsy, and in severe catarrhal affections. It may also be seen in death from strangulation, or as a consequence of putrefaction:—but the appearance of marks of violence around the neck, and the actual state of the body, would sufficiently indicate whether the last mentioned causes had any influence in its production. If we presume that the body is free from all marks of violence, and that it is seen before putrefaction is established, the Medical Jurist will only have to determine in his own mind, the probability of the frothy appearance having been produced by one of the diseases above-mentioned, or of its having resulted from the act of drowning. The presence or absence of certain corroborative signs to be hereafter mentioned, will serve to guide him in his decision. The eyes of a drowned person are often seen half open, but this state of the eyes is a character too uncertain, to serve for our guidance in the present inquiry.

In treating of the external appearances of the body, it was stated that foreign substances were sometimes found locked within the hands or under the nails of drowned subjects. The existence of an appearance of this kind, may sometimes afford circumstantial evidence of the manner in which the individual has died, but it is by no means an infallible sign. Much more importance is to be attached to the presence of

¹ Médecine Légale. Tome III. p. 87.

such substances, than to their absence. Certain cases have already been alluded to in which it is impossible that they can be met with,—these cases must be of frequent occurrence. But, on the other hand, if materials be found grasped within the hands of the deceased, which have evidently been torn from the banks of a canal or river, or from the bottom of the water in which the body is found, we have strong presumptive evidence that the individual died within the water. For although it is possible to imagine that the deceased may have struggled on the bank and have been killed prior to submersion, yet in the value attached to this sign, we are presuming that there are no marks of violence on the person, nor any other appearances about the body, sufficiently striking to lead the examiner to suspect that death has taken place in any other way than by drowning. If the substance, locked within the fingers or finger nails, be sand of the same characters as that existing at the bottom of the river or pond, it is difficult to conceive any stronger evidence to establish the fact of death having taken place subsequently to submersion. The abrasion of the fingers is a circumstance of minor importance,—no value could be attached to this state of the fingers as an indication of the individual having perished by drowning, unless it were in conjunction with the appearance above described. A witness would be constrained to admit in many cases, that the extremities of the fingers might become abraded or excoriated after death, while in no case could he be called upon to make this admission, in regard to substances found grasped within the hands.

The state of the thoracic viscera, has been described to be the same in drowning as in every other form of asphyxia : hence, with the exception of an appearance to be presently treated of, relative to the lungs, we cannot draw any presumption from the state of these viscera or of the great vessels connected with them, which can aid us in determining whether the individual perished before or after submersion.

The distended state of the lungs and the depression of the diaphragm into the abdomen, are, according to some Medical Jurists, evidences of the individual having been drowned ; but although the lungs may be sometimes distended, yet they

are often found collapsed, and the condition of the diaphragm above mentioned, appears, as I have already remarked, to have been described rather from an hypothetical view of the manner in which death takes place, than from actual observation of the state of this muscle.

The fluidity of the blood, in the drowned, is another of those disputed signs, upon which no reliance whatever can be placed by the prudent examiner; for if it were even admitted that the blood never coagulated in the body of a drowned person, the admission would serve but little to the solution of the question now under consideration. The blood may have coagulated soon after death from another cause, it may have again become liquid, and the body may be submerged; or on the other hand, the blood may be found coagulated in the body of another who has really perished by drowning. In either case, it is obvious that by relying upon the coagulated or uncoagulated state of the blood, as affording evidence of submersion having taken place during life or after death, we should fall into a very gross error.

A congested state of the cerebral vessels has been regarded by some observers, as one of the most positive signs of death by drowning; but they who are at all accustomed to post-mortem examinations, must perceive at once the fallacy of relying upon an appearance so common to many kinds of death, as an exclusive evidence of drowning. I have already made some remarks upon the state in which the cerebral vessels are found, and it is here unnecessary to assert, that, in my opinion, the witness will not be justified in affirming from the state of these vessels, whether the person died before or after submersion.

The presence of water in the stomach, has been announced as a fact by which we may determine whether the deceased perished in the water or prior to submersion. This sign of drowning, has given rise to much contrariety of opinion among medico-legal writers:—thus we find Professor Bohn arguing that water is never met with in the stomachs of those who have been submerged living; while other writers of equal repute, have contended that water can

only penetrate into the stomach by the act of deglutition, and, therefore, that when not found in the stomach, it is a proof that the body was submerged after death. Both of these parties pretend to deduce their conclusions from experiments on animals, and hence, as we might *à priori* suppose, the truth lies between the two extremes. A very few experiments will satisfy an individual, who entertains any doubt upon the point, that water may pass into the stomach of a living animal while drowning, and this most probably takes place by the voluntary act of deglutition: for I have had frequent occasion to observe that when the animal was stunned prior to submersion, water did not pass down the œsophagus. As a proof that its entrance into the organ, depends on deglutition, I may also state that the quantity contained within the stomach is greater when the animal is allowed to come frequently to the surface and respire, than when it is maintained, altogether, below the surface. The power of deglutition must be immediately suspended on the occurrence of asphyxia, and in this way, may we perhaps most satisfactorily account for the difference observed in the two cases.

We allow then that water may enter into the stomach of a drowning animal but in variable quantity, and we must at the same time, admit that there are cases of drowning in which water is not discovered in the organ. In dissecting cats which had been drowned, I have repeatedly remarked the absence of water from the stomach; in these cases, the animals had been invariably kept under water from the first moment of their submersion, and thus in a condition but little favourable to the exercise of deglutition. Water does not readily penetrate into the stomach of a subject which has been thrown in after death: the parietes of the œsophagus applying themselves too closely to each other, to allow of the passage of the fluid. If putrefaction has advanced to any extent, it is possible that water may enter: but the practitioner will easily judge from the state of the body, how far this process may have been concerned in the admission of the fluid into the stomach and alimentary canal. It is however, necessary for the Medical Jurist to know that there are cases

in which water may be found in the stomachs of persons apparently drowned, and yet it will afford no evidence of death having been caused by drowning. Thus, if a body be sunk to a very great depth in water, this fluid will find its way into the stomach and alimentary canal by virtue of its columnar pressure. In order to ascertain how far columnar pressure would influence the quantity of water contained within the stomach of a drowned animal, I performed the following experiment. Three cats of nearly equal size were taken :—No. 1 was rapidly lowered to the depth of fifty-five feet in the Thames :—No. 2 was lowered to the depth of two feet below the surface of the water, being forcibly maintained in that position :—while No. 3 was drowned on the surface, but was allowed to sink and rise to respire frequently before death. The three cats were removed from the water after the lapse of a quarter of an hour, and, on examination, it was discovered that the stomach of No. 1, was completely distended with water, that little or no water was contained in that of No. 2 ; but that the stomach of No. 3, was filled, although not to so great an extent as that of No. 1. By comparing the results obtained in the two first cases, we must be allowed to infer that the depth to which an animal sinks in drowning, may affect materially the quantity of water found within its stomach. The influence of this columnar pressure, may be conceived to act on the body whether it be submerged living or dead, and, therefore, it will be proper that the witness should take this into consideration before he positively decides from the discovery of water in this organ, that death has taken place by drowning.

Orfila has suggested that water may be found in the stomach of a subject apparently drowned, in consequence of that liquid having been artificially injected after death. It is difficult to conceive under what circumstances such an injection could be made, or what purpose it would answer ; but a barrister might make use of this observation, where a medical witness relied too confidently upon the presence of water in the stomach as positive evidence of drowning. It is of course presumed that the liquid contained within this organ, is of the same nature as that in which the body is

immersed ; for it is possible that fresh water may be found in the stomach of a person drowned in salt water, and in such a case it would be obviously improper for the medical witness to affirm, from the mere existence of water internally, that the individual had died within the medium in which his body was discovered.

Again, it is necessary to bear in mind, that the person, in whose stomach water is found, may have drunk a large quantity, and may or may not have been killed prior to submersion. In such a case, the presence of water in the stomach would not shew that death had been caused by drowning, unless the presumption of its having been voluntarily taken previously to submersion, was negatived by the circumstances. Thus then, to take the affirmative side of this question,—a Medical Jurist who discovers water in the stomach of an apparently drowned subject, will have to consider whether the water did not find its way into this organ,

First, in the submersion of a *dead* body.

1. From the effects of putrefaction.
2. From the fact of the body having been sunk to a great depth.
3. From the water having been artificially injected after death.

Secondly, in the submersion of a *living or dead* body.

1. Whether the water had not been drunk by the deceased before death.

If he can satisfy himself that none of these casual circumstances have operated in the introduction of water, and the fluid within the stomach is of the same nature as that in which the body is immersed, he is, I think, entitled to affirm that this appearance in a suspected case, affords very positive evidence of death having been caused by drowning.

On the negative side of the question, it may be asked : whether the Medical Jurist, is justified in declaring from the *absence of water from the stomach*, that death has not taken place by drowning.

In giving an answer to this question, we may observe that there are many cases of drowning in which water is not discovered in this viscus after death ; and its absence may

be explained by a reference to the following circumstances :
 —1. Water may not have entered into the stomach in consequence of asphyxia having been rapidly induced,—of death having taken place by syncope at the moment of submersion, or of the individual having been previously stunned: in any of which cases, the power of deglutition will be lost. Again, the person may, by the exertion of volition, resist the tendency to swallow; and it is, I believe, chiefly owing to this circumstance, that water is not found in many animals which have been drowned for the purposes of experiment. That water is frequently absent from the stomachs of the drowned, is well known to those who have dissected these subjects, and, therefore, but little value can be attached to its absence as an evidence against the presumption of death by drowning. 2. It may happen that water has entered into the stomach in the act of drowning, but that casual circumstances after the removal of the body from the water have caused its disappearance. Thus, if the head of a drowned subject after removal, be kept considerably depending, the body being raised, the water which the stomach may have contained in the first instance, will entirely drain away. Two cats were drowned in nine fathoms of water; consequently under circumstances for their stomachs to become perfectly filled. After having remained at this depth for half an hour, they were removed and hung up with their heads depending. Water drained freely from them, and on examination of the bodies three days afterwards, none was discovered in the stomach or alimentary canal. There is nothing remarkable in this fact, it is a result which the Medical Jurist might be prepared to expect; but it seems to have been lost sight of as a probable cause of the absence of water, in many investigations relative to drowning. 3. Water may have entered into the stomach in drowning, but by long exposure of the body after its removal, it may have transuded through the parietes of the stomach, and have become gradually lost by evaporation. This will be particularly the case in those subjects which have become much decomposed.

Before the witness attempts to draw any inference from the absence of water in a question of drowning, let him,

then, deliberately consider how far the continuance of this fluid within the stomach, where it is probable that it has originally entered, may be influenced by the casual position of the body, or by subsequent exposure. In bringing forward these numerous exceptions to the presence or absence of water in the stomach, as evidence for or against the presumption of drowning, it may be said that this sign is deprived of all the value which was formerly attached to it; and that there are few witnesses who could spare the time necessary for the consideration of the objections that might be urged by counsel to the inferences which they might otherwise have drawn from it. To this I would reply, no prudent Medical Jurist would give an opinion unfavourable to an accused party, unless he had first thoroughly satisfied himself, so far as it lay in his power, that that opinion could not be objected to. If through an ignorance of the difficulties connected with these investigations, the witness should rashly pronounce an opinion which, on a proper exposure of the facts, the case would not warrant, it is far better that he should be publicly reminded by counsel of the fallibility of his statements, than that a man who may probably be innocent of the imputed crime, should suffer in consequence of his want of opportunity to make himself acquainted with the intricacies of the subject.

The presence of a mucous froth in the trachea and lungs, has been considered in many cases sufficient to determine the question which we are now considering.

The trachea in a drowned subject has been already described as being frequently covered by a mucous froth, and this is stated, in some instances, to have been so abundant, as to have filled the bronchi and their ramifications. The origin of this appearance has been variously accounted for; but it is only recently that any satisfactory experiments on the subject have been made. In order that this mucous froth should be present in the trachea of a drowned animal, it is necessary, according to the observations of Piorry and Orfila, that the animal should rise frequently to the surface to respire; and it appears to be produced by the simple agitation or admixture of the air so respired with the mucous

secretion of the air passages, which, perhaps, under these circumstances, is more copiously poured out. The experiments that I have performed have afforded results which agree with those obtained by Piorry and Orfila. I have only seen this mucous froth in the tracheæ of those animals which had been allowed to rise frequently to respire before being drowned. When the animal was maintained altogether under water, as when it was sunk to a great depth in the river, this appearance was not met with,—the trachea was perfectly smooth. Such then being the condition requisite for the production of the mucous froth, it is obvious that there must be many cases of drowning, in which it will not be present; and we have, therefore, to consider, how the presence or absence of this appearance, can aid the Medical Jurist in determining the question at issue. Its *presence* will not justify him in swearing positively that death has taken place by drowning, unless he is prepared to shew that it could not have proceeded from any other cause. Now it is necessary to state, that a somewhat analagous appearance may result from other causes. 1. A similar mucous froth has been observed to cover the tracheæ of those who have died of epilepsy or of apoplexy, who have been hanged or strangled, or who have perished from the respiration of certain deleterious gases.¹ It is also asserted, that catarrhal affections might give rise to a state of the trachea which, if the subject were found in water, might deceive the examiner who relied too confidently on the presence of such a sign. 2. Putrefaction might also lead to the production of a mucous froth in the trachea of a person whose body had been thrown into the water after death.

In reviewing these objections to the inference which has been hitherto drawn from the *presence* of this sign in bodies apparently drowned, it is to be remarked, that the only cause capable of producing it in a body which has been thrown into the water after death, is putrefaction;—therefore, if the body be not in a state of decomposition, let the practitioner examine the neck to see whether there be any

¹ FODERÉ. Méd. Lég. Tome III. p. 97.

marks of violence about it,—let him balance in his mind the probability of the appearance resulting from an attack of epilepsy or of apoplexy previously to submersion, and draw his inference accordingly ; for it is not upon one, but upon many circumstances that a medico-legal opinion can be securely founded. Where these doubts can be removed, the presence of a mucous froth covering the trachea, may be considered as affording very positive evidence, that death has taken place by drowning.

Let us now examine the opposite side of the question, and inquire how far the Medical Jurist is justified by the *absence* of this appearance from the trachea, in affirming that an individual has not been drowned.

From the circumstances under which this mucous froth is stated to have been found, we are prepared to understand that it will not be seen in many drowned subjects ; namely, 1. in those who have not risen to the surface after the first submersion. 2. The appearance will not probably be met with where the subject has remained for a long period in the water after death, since by the free passage of this fluid into and out of the trachea, the mucous froth, although formed in the first instance, will disappear. 3. If, after removal from the water, the subject be exposed to the air for several days before it is examined, it is rare that this appearance is seen. 4. The mucous froth may be formed on the trachea, but it may be entirely removed by the incautious manner in which the body may have been handled on its removal from the water. Thus, if the subject be removed from water with the head depending, any fluid which may be contained within the lungs will escape, and in passing through the trachea, this fluid will effectually obliterate the mucous appearance if it previously existed. Morgagni was the first to observe this fact. Piorry and Orfila have repeated his experiment with the same result ; and it is not difficult for the examiner to satisfy himself of the correctness of the above statement. The experiment which I performed to confirm the view above given, was of the following nature. Two cats were drowned in such a way as to ensure the presence of a mucous froth in the trachea. The bodies

were allowed to remain for a short time in the water, they were then removed and suspended, the one with the head erect, the other with the head depending. On examining the bodies the next day, a mucous froth was found in the trachea of the former; but none was apparent in the trachea of the latter. These facts then will prove that too much importance must not be attached by the witness to the *absence* of this mucous froth in subjects apparently drowned.

We have now to consider how far *the presence of water in the lungs*, can enable the Medical Jurist to determine whether death has taken place by drowning. It seems to have been first particularly noticed by Larrey, that water penetrated into the bronchiæ in drowning, and it was observed in a preceding page that the entrance of this water, in the opinion of some physiologists, was the immediate cause of death. Many contradictory statements have appeared relative to the presence of water in the lungs of the drowned; and it is a singular example of the influence of prejudice over human opinions, to find authorities of great repute ranging themselves on opposite sides of a question of fact. A want of confidence in each other's theories, and an utter disbelief of each other's statements, appear to have been the true causes of the controversies which have arisen among writers on this subject. These discussions have long since ceased to excite any interest, and therefore, it is unnecessary to revive them: but with regard to the question at issue, we may distinctly assert, that the glottis does not in every case of drowning become so effectually closed, as to prevent the introduction of a portion of liquid into the pulmonary cells. Orfila¹ looks upon this point as so unequivocally established, that he contends that water invariably penetrates into the lungs of drowning animals: the quantity, however, in which it is found in the bronchiæ after death, will, he observes, depend on many contingencies. His experiments were performed in coloured liquids, and, consequently, he could readily distinguish the presence of the

¹ Méd. Légale. Tome II. p. 341.

least quantity in the bronchial cells. He appears never to have failed in discovering liquid under these circumstances; and in the examination of several recently drowned animals, I have constantly seen water present in the lungs where care had been taken in the removal of the body. But, notwithstanding this, some Medical Jurists have not met with it, and, therefore, we may conclude that it is not always present. The quantity which enters into the lungs is commonly small, but it is subject to variation, and it will probably depend on the number of forced attempts at expiration made by the drowning animal. I have not remarked any difference in the quantity whether the animal were allowed to rise to the surface and respire, or whether it were maintained altogether below; but I have found that it has been greater in the lungs of those animals which had been suddenly sunk to a great depth and drowned, than in others,—contrary to the assertion of Dr. Smith,—“that the deeper the water in which the person is drowned the less will be the facility afforded to the entrance of the fluid, because,” as he supposed, “the external and denser fluid will press more powerfully on the epiglottis in proportion to the height of its column.”

Admitting, then, that water is found in the lungs, it may be required to determine whether it entered during life, *i. e.* in the act of drowning or after death. Many have imagined that the organic sensibility of the glottis, was such as effectually to prevent the entrance of a foreign fluid like water until the last moment of existence. Of this opinion, is Dr. Edward Cox,¹ but the more common belief is, that a certain portion passes into the trachea in the commencement of drowning, although not in sufficient quantity, as effectually to prevent attempts at respiration. When we consider that air is expired at intervals from the lungs in drowning, while the head of the animal is below the surface of the water, it is natural to suppose that at each expiration a small quantity of water must penetrate through the rima glottidis; but without speculating upon this subject, we may appeal at

¹ SMITH. Forensic Medicine, p. 225.

² North American Medical and Surgical Journal, 1826.

once to the experiments of Orfila, as affording conclusive evidence of the fact. Having plunged two dogs under water, he secured the tracheæ by ligatures after the submersion of a minute in one case, and of half a minute in another,—the whole of the steps of the operation being previously prepared. In both of these cases, on dissection he found liquid in the bronchial ramifications. There is but little doubt that the quantity becomes increased after death, because it is now well known that water will penetrate into the lungs, when a body has been thrown in dead, and before the access of putrefaction. This it is important for the medical jurist to bear in mind, as it may influence materially the opinion which he may be disposed to form on the discovery of water in the lungs of an apparently drowned subject. Orfila and Piorry found that the quantity thus admitted, varied according to the position of the dead body of the animal. The liquid freely penetrated, when the body was retained under water with the head erect, as far as the ultimate ramifications of the bronchiæ: but it entered less freely when the body was in a horizontal position. If the head were entirely depending, it is probable that none would enter. These variations, according to the position of the body, may perhaps satisfactorily explain why some observers have stated that water will not enter into the lungs where submersion has taken place after death.

From these observations, then, the medical jurist will perceive that water may be present in the lungs and yet it will afford no evidence of drowning, since it is capable of penetrating in a dead subject. It has been also suggested that water may have been injected into the lungs after death, in which case, an incorrect opinion might be formed from its presence, if the body were discovered on the bank of a river or canal. This, however, is an obstacle but little likely to interfere with medical investigation.

On the other hand, the absence of water from the lungs of a subject found apparently drowned, must not be considered to indicate that death is not a consequence of drowning; for if the body be removed from the water and allowed to remain with the head depending, the water originally contained

within the lungs, will drain out ; or if it be long exposed before undergoing an examination, the probability is, that none will be discovered in these organs, since in the progress of time it may disappear by absorption and evaporation. Orfila remarked, that when a body had remained above a month in water, and when after removal, it had been, as usual, exposed for two or three days at the Morgue, no liquid was contained in the lungs.

We have now reviewed the whole of the evidence, which the post-mortem examination of a drowned subject, is capable of affording to the medical witness. It will be seen that the only characters met with internally, upon which any confidence can be placed to indicate that the individual has been drowned, are the presence of water in the stomach and the presence of a mucous froth on the lining membrane of the trachea ; but at the same time, the restrictions to the admission of these signs as evidence of drowning, are such as to throw great uncertainty on the correctness of a medico-legal opinion founded simply on their existence. The practitioner must then determine, before he decides positively in a question of this nature, whether there be any appearance about the person which would lead to the suspicion that death had been caused in another way. When he has provided himself with this negative evidence, and he finds that the characters already enumerated, are present,—or if absent, he can, with any shew of probability, account for their absence,—he is then justified in giving a decided opinion on the subject, always taking care to express any doubt which may be lurking in his mind, so that the court may not be led by the mode in which he delivers his evidence, to withhold that mercy from the prisoner which the expression of a doubt by the medical witness is commonly sufficient to ensure.

IV. *Marks of violence on the apparently drowned.* When the body is removed from the water, and submitted to medical examination, it may happen that marks of violence will be found on the person, of so extensive a nature, as to lead to a just suspicion that the individual had been murdered previously to submersion. The most important questions,

which may arise relative to these marks of violence on bodies so found, will be :

1. Whether they are of such a nature as to account for death before submersion.
2. Whether they were inflicted before or after death.
3. Whether, in either case, they were the result of accident or of design.
4. Whether if received during life, they were self inflicted or inflicted by others.

Sometimes a wound may be discovered on a subject under these circumstances, which may appear sufficient to account for death ; but before the practitioner can affirm that it was the cause of death, it will be necessary for him to determine whether the wound was inflicted before or after death. This question it is unnecessary to enter into at present, as it will be more appropriately considered, hereafter, in speaking of the subject of wounds. In endeavouring to decide in a case of this nature, it is necessary for the medical jurist to remember that an apparently mortal wound may have been received during life, and yet not have been the cause of death ; since after having received the wound, the deceased while living, might have been thrown by his murderers into the water. In a suspected case of this kind, he should observe whether there be the appearances of drowning about the body or not, and decide accordingly. If there were no traces of death by drowning, and the examination of the body had not been delayed, he would be justified in affirming that death had preceded the submersion of the deceased.

In order to give an answer to the third question, namely, whether the marks of violence resulted from accident or design, the witness must accurately notice their situation and extent ; he must give a due value to the contingencies to which a body, floating loosely in water, may be exposed. Ecchymoses of very considerable size, are sometimes seen on drowned subjects, where they have been carried by a current against mechanical obstacles in a river or canal. At the same time, if the deceased had fallen from a considerable height into the water, his body in falling, may

have struck against a bank or projection, and have produced a very extensive mark of violence. It is manifestly impossible to lay down any specific rules for forming a decision in these cases, since probably no two instances will be met with which will be perfectly similar. In clearing up these doubtful points, every thing must depend on the tact and acumen of the practitioner who is called upon to conduct the investigation; and not the least of the considerations which ought to render him cautious in forming his opinion, should be the reflection, that that opinion will in most cases have considerable influence on the fate of an accused party.

Accidental violence may sometimes be of a very serious nature,—so serious that a practitioner might well be supposed to doubt, whether it did not indicate that the deceased had been violently injured prior to submersion. If a dead body were taken out of the water, with one or both extremities dislocated, and a surgeon were asked whether such an injury could be accidental and coincident with or consequent on drowning, the answer would probably be in the negative. But a case has been known where both arms have become accidentally dislocated at the time of drowning. This case is related by Dr. Smith: ¹ it is that of a man, who, some years since, jumped from the parapet of London Bridge into the Thames for a wager. This exploit, it appears, the man had previously performed with impunity, but in this instance, he sank and was drowned. Both of his arms were dislocated, in consequence as it is presumed, of his having fallen with them in the horizontal position instead of adapting them closely to his sides. The concussion on falling into the water, had sufficed to produce the accident. Here then we have a proof that even the mechanical resistance offered by water alone, may give rise to marks of very violent injury on the person.

On the examination of a body which has lain some time in water, the membrane lining the stomach and viscera, may appear of a dark red colour or present ecchymosed patches. This appearance has been already described as a natural

¹ Forensic Medicine, p. 228.

consequence of the long residence of a subject in water, therefore we must be cautious not to allow ourselves to be misled by it. If there should be a remote suspicion of the individual having been poisoned, the contents of the stomach should be carefully analysed: if the body were recent and a similar appearance should present itself, this may be looked upon as affording *prima facie* evidence of poisoning. In concluding these observations on marks of violence, it may be observed, that they are sometimes of a nature to forbid the idea of their accidental origin after submersion. Thus, there may be severe and extensive bruises about the person,—deeply penetrating wounds involving the cavities of the body,—gun shot wounds,—a deeply ecchymosed circle around the neck, or the marks of violent compression about the larynx and trachea. All such injuries, provided the post-mortem appearances of drowning be absent, afford the strongest presumptive evidence of homicide prior to submersion.

I shall now give a few cases, the details of which may serve to illustrate the observations which have just been made, concerning the importance to be attached by the medical examiner to marks of violence when seen on the bodies of the apparently drowned.

At the Old Bailey Sessions, in September 1832, two men of the names of Kennedy and Brown, were tried for the murder of a Mr. Wilkinson.

It appeared in evidence, that the deceased, in company with a friend, had made an excursion up the Thames. They were returning late in the evening, when the prisoners, who had been for some time following them, suddenly forced their boat against that in which the deceased and his friend were sitting. In the confusion which ensued, the prisoner Kennedy seized the coats of deceased and his friend, which were lying in the stern of the boat, and hastily pushed off. The deceased on this jumped into the water and laid hold of the gunnel of the prisoners' boat, endeavouring to make them return the stolen coats. One of the prisoners now aimed several violent blows at the head and hands of the deceased; and his friend, who was a witness of the whole of the circumstances, deposed that after having been struck, the

deceased fell back, making a sort of murmuring noise, and sank. The surgeon who examined the body which was not removed from the water until some time after death, deposed, that he found marks of various contusions about it. There was a considerable bruise on the forehead, accompanied by great extravasation of blood under the skin, and this corresponded in situation to a large effusion of the same upon the hemispheres of the brain. The witness gave it as his opinion, that the blows alone were sufficient to have caused death *ultimately*; but he could not speak positively to the fact of drowning.

The witness was closely cross-examined by the prisoners' counsel, who endeavoured to elicit an opinion from him to the effect that the injuries or contusions, which he had observed on the body, might have been produced *after* the drowning of the deceased: but he gave his testimony in so clear a manner, that the attempt on the part of the counsel, proved abortive. The prisoners were found guilty.

In the following case, the questions were more numerous and less satisfactorily answered. It was tried at the Hereford Lent Assizes in 1832; and its details are well worthy of the attention of the medical jurist.

Three men of the names of Pugh, Williams, and Matthews, were charged with the wilful murder of Walter Carwardine, by striking him on the head, and in another count, by throwing him into the river Wye.

The facts of the case were as follows. It appears that the deceased, who was a respectable farmer, arrived in Hereford, March, 1831, for the purpose of settling some legal affairs in which he was engaged. On the evening of his death, the 24th March, it was proved by several witnesses, that he went with some women of low character to the house of the prisoner Pugh, after which he was missed until on the 12th April following, his body was found in the river Wye, nearly two miles from a spot called Monk's Hole, his hat having been previously taken out near this last-mentioned spot. A suspicion had at first rested upon a woman of the name of Connop, who was lodging at the time in the house of the prisoner Pugh, and she was accordingly tried for the murder

at the previous assizes, but acquitted under the direction of the judge for the want of evidence. One of the witnesses on that trial, was a girl who was in Pugh's house at the time of the murder ; but who did not then confess all that she knew of the affair. Soon afterwards, this witness became seriously ill, and, while lying, as she thought, without the hope of recovery,—she resolved to relieve her conscience by making a full confession. The statement which she then made corroborated as it was by other evidence, led to the apprehension and trial of the prisoners.

By the evidence of many witnesses, who stated that the deceased was a little intoxicated, he was traced on the night in question to the house of the prisoner Pugh. In the course of that night, the neighbours of Pugh were disturbed by a violent knocking and kicking at his door, and it was then that the deceased was seen to be endeavouring to force his way into the house. Blows were repeatedly exchanged, and a voice, which was recognized to be that of the deceased, was heard to exclaim :—" You have robbed me, have mercy upon me and do not murder me." After a time, all was silent, and the noise then seemed to go further off. One of the prisoners, on being asked the same evening what they had done with the deceased, said they had taken him away and that it made no difference to any one whither they had taken him. On the day after the discovery of the hat, the prisoner Williams, went to the brother of the deceased,—described himself under a false name, and asked to be employed to search for the body. When the latter stated that he thought his brother had gone home and that he was not dead, the prisoner replied that he knew to the contrary,—he knew that the body of his brother was lying in the spot called Monk's Hole.

One of the surgeons who examined the body, deposed that there was a red patch on the temple two inches and a half long ; and from this seven or eight lines radiated as if from a centre, in consequence of which he was led to conclude that the wound had been caused by the violent use of some blunt instrument. There was a red line, extending about three-fourths round the neck, of a finger's breadth behind ;

but connected with a patch of redness nearly three inches wide in the fore part. These marks he conceived might have been caused by pressure during life. There were other patches on the shoulders, back, and loins, which could scarcely be said to amount to bruises. Between the pericranium and bone, there was found a patch of extravasated blood about the size of a shilling. The brain was gorged with blood. *No water was discovered either in the trachea, lungs, or stomach.* The witness stated it as his opinion, that a blow might have caused death at once; or the deceased might have been stunned and have then fallen in such a position as that his shirt-collar and cravat, would prevent the return of blood from the head. He did not think that this pressure was caused by manual violence.

On his cross-examination, he stated that some of the marks might have been *caused* by decomposition, the body having remained nineteen days in the water,—that a man knocked down, might fall stunned with his chin upon his chest so as to interrupt the processes of respiration and circulation. The mark on the forehead, he considered to have resulted from violence inflicted during life, but the fissure of the skull beneath, was of old standing. He thought it improbable that the wound on the forehead should have produced death. He considered it doubtful, whether the deceased was put into the water after death or not. Under all the circumstances, he thought that *no certain opinion could be formed of the cause of the death of the deceased.*

In answer to a question put by the Judge, the witness said, he was of opinion *that the deceased did not die of drowning.*

Another surgeon stated that, with the exception of the mark on the head, he had seen all the appearances met with in the deceased, in a man who had certainly been drowned; and he had also seen similar appearances in the bodies of persons who had been hanged. *If the deceased had fallen accidentally into the river and had struck himself in falling, all these appearances might have been produced.*

The case now resolved itself into one of accident or

of homicide. In favour of the former there were the facts,—that the deceased on the night of his death, was partly intoxicated ;—that the place called Monk's Hole, where the body had been found, was close to the bank of the river ;—that a man in passing at night, might slip off the bank and be drowned ;—and lastly the admission of the medical witness, that the appearances on the body might have resulted *from accident*. In favour of the presumption of homicide, there was the strongest general and circumstantial evidence which brought the offence home so clearly to the prisoners, that the jury, after a very short deliberation, returned a verdict of guilty. The prisoners were subsequently executed.

By an attentive examination of this case, it will be seen that the conviction of the prisoners took place rather in spite of the medical evidence than in consequence of it ; for the admissions made by the witnesses were such as to throw very great doubt upon the manner in which death took place. The first witness is reported to have given it as his opinion, that death did not result from drowning ; and at the same time to have admitted that the principal mark of violence on the person, namely, the blow on the forehead, was not the cause of death. The absence of water from the stomach, lungs, and trachea, would have led to the belief, that the deceased had not been drowned, supposing that the *position of the body* had been attended to on its removal from the water. Whether the wound on the forehead was sufficient to have produced death in this case or not, is a question which could only be decided by an eye-witness. But unfortunately, it very often happens that a wound which is seen on a dead body, is pronounced to be mortal by one surgeon while it is not regarded as such by another. No rules can be laid down on this point, and, therefore, we may presume that the witness in the above case fairly stated what he thought. At the same time, this admission relative to the simple nature of the wound, ought to have made him examine more rigorously the grounds on which he asserted that death did not result from drowning. It must be evident to all who peruse the report of this case, as it was to the jury on the

trial, that the deceased was either killed by the violence inflicted by the prisoners prior to submersion, or his death was the result of homicidal submersion. The statement of the second witness, "that the marks of violence and other appearances on the body of the deceased, might have been produced if he had accidentally fallen into the river and had struck himself in falling," does not appear to have been borne out by the circumstantial evidence.

Judging from all the facts, detailed in evidence, it appears probable that the deceased was first violently stunned by the blow on the forehead, and was then thrown into the water by his murderers. In such a case, the body would at once fall to the bottom of the river, and no effort would be made by the individual to respire or swallow; consequently, water would not be found either in the lungs or stomach, and there would be no mucous froth in the trachea.

The following case, in which marks of violence on an apparently drowned subject, led to a suspicion of the real cause of death, is extracted from Dr. Smith's work.¹

In a small village in Warwickshire, in the year 1800, a young gentleman suddenly disappeared on the evening previous to his intended marriage. After a lapse of some days, his body was found floating in a neighbouring mill-stream; and it was generally concluded that he had committed suicide, although the cause for such a rash act, could not be conjectured. Upon stripping the body, some marks of a suspicious nature were discovered upon the throat. A surgeon was sent for to decide whether death had taken place from any other cause than drowning; and this surgeon, after minute examination, gave it as his opinion, that the deceased had died by strangulation. Suspicion now fell upon a man of bad character, who had been seen on the night that the deceased was first missed, running in great haste from the direction of the spot in which the body was subsequently found. This man was apprehended, but no satisfactory evidence of guilt being elicited by the examinations, he was discharged. Ten years afterwards, this

¹ Forensic Medicine, p. 242.

suspected person was convicted of sheep-stealing, and sentenced to transportation. While on board the hulks, he made a voluntary confession of having destroyed the deceased; and declared that such was his remorse and the horror of his conscience, that he earnestly desired to expiate his crime on the scaffold. He was subsequently tried for the alleged offence entirely on his own evidence, which was as follows.

He stated that upon the evening of the fatal event, he was stealing potatoes from a field-garden belonging to the deceased, whom he unexpectedly saw coming over the gate to secure him, upon which he jumped over the hedge on the opposite side and ran across the field to make his escape. The deceased pursued him and being an active young man, nearly overtook him, when he (the prisoner) attempted to leap the mill-stream; but the bank on the other side giving way, he fell back into the water. The deceased instantly plunged into the water after him and endeavoured to secure him. A desperate struggle now ensued, and the deceased had at one time got the prisoner down under him in the water, by which he was half-drowned. At length he succeeded in overturning the deceased, and seizing him by the throat, held him fast in this manner under water, till he seemed to have no more power. He then left him, sprang out, and made his escape. The Judge gave it as his opinion, that the case amounted only to excusable homicide, and accordingly the man was acquitted.

The medical opinion respecting the marks of violence on the person of the deceased, was, it will be perceived, perfectly verified by the man's confession: and this, among other cases, should teach the witness that the mere circumstance of finding a body in water, is not to be regarded as a proof that death was occasioned by drowning: although, to judge from the verdicts of juries, this is the proof upon which the coroner chiefly relies.¹

¹ It is a fact too well known to require notice in this place, that jurymen and coroners are for the most part averse to allow of the inspection of a dead body, where it is presumed that death has been occasioned

The last case which I shall mention, in illustration of this part of the subject, was tried before Lord Lyndhurst, at Durham, in July, 1834.

Thomas Hodgson, a master mariner, was charged with the murder of Ann Lumsden, a woman with whom he cohabited.

On the day of the murder, the prisoner went to the house of the deceased in Sunderland, by appointment, and they were observed afterwards to walk towards the cliff. They were subsequently seen quarrelling on the beach together. On the following morning, about five o'clock, the body of the deceased was found lying on the beach about eight yards from the base of the cliff,—her head being towards the sea,

by drowning. In all such cases, they must decide upon the presumption, and not upon actual proof, that the individual was drowned. Thus it is that a verdict of "*found drowned*" is almost invariably returned upon every case where an unknown body has been taken from the water. Such a practice is highly condemnable, and we need no longer be surprised at the unsatisfactory state of medical evidence relative to drowning, when we find that the only means by which it can be improved, are cut off from the profession. This, however, is not the least of the evils consequent on the perseverance in such a practice. It is impossible either for a surgeon, coroner, or juryman, to pronounce from the external appearance of a body, whether it was submerged living or dead; and, in the absence of evidence, whether the deceased had been poisoned or not before he had been cast into the water.

When, however, we find that medical coroners neglect to make an inspection in these cases, we must not expect that they who are not of the profession, will do otherwise than follow their example.

A trial took place about a year since in the North of England, which involved the question of murder by drowning. The prisoner and the deceased quarrelled on the bank of a river, when the latter, during the scuffle, was violently thrown into the water by the former. The next day an inquest was held on the body of the deceased. The coroner was a surgeon, and the chief medical witness on the trial which subsequently took place. He stated that he found a considerable cut above the left eye, and a bruise above the right eye apparently inflicted by the fist. These wounds he considered to have been produced before death; but they were not in his opinion sufficient to account for death. He acknowledged on the trial that he did not make an anatomical examination of the body, *because he felt satisfied that death was produced by drowning.*

It was well that, in this case, the general evidence was so clear. If there had been any deficiency in this, it is certain that the neglect to examine the body, would have been attended with great inconvenience.

and her clothes wet and wrapped round her person. The witnesses who first saw the body, deposed that there were marks of blood about the mouth, and the nostrils were apparently full of blood. When first discovered, the waves were beating against the head of the deceased, and the tide was running down. There were no marks of footsteps about the beach, which it appears was formed of hard sand.

The body was examined by several medical practitioners, and the appearances found were as follows. There were marks of violence on the back of the neck, ankle and thighs, and a small abrasion on the lower lip. On the inside of the lip, there were four lacerated wounds corresponding to marks of the teeth. On opening the abdomen, about four pounds of uncoagulated blood escaped. The liver was enlarged by disease, and extensively lacerated. The blood which was discharged, apparently flowed from the lacerations, which, in the opinion of the witness, took place after death, and might have been caused by the removal of the body from the beach, the liver being so soft, as to be easily lacerated by the slightest pressure. The abdominal viscera were turgid with blood of a dark colour. It was stated by some of the witnesses, that the false rib behind the right kidney was broken. The stomach contained six ounces of grumous matter, *but no salt water*. The membranes of the brain were injected, the heart was healthy, but *it contained no blood*, a fact which, in the opinion of the witness, proved that the deceased had died suddenly. It is worthy of remark that the stays which the deceased wore, were not wet.

The witness, from the report of whose evidence this account is chiefly extracted, admitted that in death from drowning, *water is sometimes found in the stomach, but generally upon the lungs*; also that blood is commonly found collected on the right side of the heart. He considered that the deceased did not die either by drowning or suffocation. The marks of violence, externally, were such that they might have originated in a fall during a fit of drunkenness: while the internal lesions might have been produced partly by manual violence in the removal of the body or by exposure to cold.

This witness's evidence was generally corroborated by that of other medical men; but some considered that the injuries described, were accidental, and that they had occurred after death, while others believed that they were received during life, and were the real cause of death. It was admitted by the whole of the witnesses, whose evidence was reported, that the marks of violence, might possibly have occurred from a fall.

The prisoner, who was identified as the man seen walking with the deceased on the night that she was last seen living, made a voluntary statement before the coroner, in which he admitted that he was in the company of the deceased on the night in question,—that she was intoxicated, and threatened to drown herself. He tried to dissuade her from her resolution, but finding this ineffectual, he left her. On his return home he was seized with the cholera, and had been confined to his bed from that time until the inquisition was held. It was also proved, that he and the deceased had been generally on very good terms.

Lord Lyndhurst now addressed the counsel for the prosecution, and submitted to them, whether they had made out a case to go to the jury. They immediately admitted that they had not; and his lordship then observed that from the difference of opinion among the medical men as to the cause and manner of death, their opinions being all conjectural, he thought the prisoner's life ought not to be affected! The prisoner was instantly acquitted.

In this case, the presumption that the deceased had perished by drowning was, it appears to me, negatived: Firstly, by the presence of the lesions externally and internally. Secondly, the absence of salt water from the stomach, if the precautions already referred to, had been taken in this case. Thirdly, by the circumstance of the stays not being wet when the body was first examined. It is difficult for one who was not present at the inspection of the body, to say whether the injuries observed on her person were sufficient to account for her death or not;—whether they were inflicted before or after death, or whether they resulted from accident or violence: but there appears to

have been considerable doubts in the minds of some of the witnesses, in regard to these points; and therefore, it was but just that the prisoner should have the benefit of those doubts. This case will afford to the witness a fair idea of the importance which is attached by the law to medical evidence on these occasions.

In investigations relative to death by drowning, where it is satisfactorily proved that the individual has really perished by this kind of death, the following question may arise.

Was the drowning the result of accident, of suicide, or of homicide?

This question fortunately does not commonly fall within the province of the medical jurist. It is generally determined by the verdict of the jury from the circumstances proved on the trial. The rules which have been given by some medico-legal writers for the pretended purpose of guiding the witness, are such, as would often lead to pernicious errors if they were followed. Some recommend that we should examine the spot where the body was found, that we should remark the height of the banks, if it be a river, and notice every point connected with the locality; but such sagacious reasoners have not considered that the spot where a body is found, may not always be the spot in which drowning took place. In the case of a river or canal, it must be extremely rare that a body will remain in the exact site in which the individual was drowned. It has been stated, that the post-mortem appearances are different in accidental or suicidal drowning from those which are seen in the bodies of persons who have been the subjects of homicidal submersion. But the statement is too absurd to require refutation. Again it is asserted, that there are certain post-mortem appearances in suicide, upon the presence or absence of which, we may form an opinion. Foderé¹ quotes a case from Elvert, a German writer, in which from certain projecting ridges on the tabula vitrea of the skull, and from the diseased liver and uterus, the medical examiner

¹ Méd. Lég. V. 3. p. 120.

inferred that the intellectual faculties must have been sufficiently disordered, to have led to the commission of suicide! No prudent practitioner would, in the present day, ground an opinion upon evidence of this nature. It may be safely affirmed, that there is nothing in the post-mortem inspection of the body, which, in the absence of all other evidence, can afford any solution of the question at issue. It is only from circumstances, sometimes of a moral and sometimes of a physical nature, that we can judge of the fact; and, therefore, the medical jurist is no better provided with the means of deciding, than those who are concerned in the administration of the law. The presence of wounds or contusions about the person, the fact of the clothes being torn, or of grass or other bodies being grasped within the hands, may afford a remote presumption, that the submersion was the act of a murderer. But even, in this case, we must remember, that such circumstantial evidence may exist to its fullest extent, and yet the individual may have accidentally fallen into the water, or at any time after the struggle may have thrown himself in. The fallibility of circumstantial evidence, is well known in relation to matters upon which every one is cognizant; but the free admission of it as the basis of a medical opinion, should be carefully guarded against by the witness. I refer now to cases of supposed homicidal submersion, where the fate of a prisoner may depend on the utterance of a few words: in questions of suicide or accident, it matters but little whether he form his opinion from circumstantial evidence or not, for it cannot affect the life of a fellow creature. In a question of alleged murder, however, the case is very different,—the witness, by the manner in which he expresses his opinion, may give to circumstantial evidence the decided character of medical evidence,—it may pass uncontradicted, and, if at all borne out by the statements of other witnesses, which would probably possess no value without this corroboration, it may have the effect of turning the minds of the jury altogether against the prisoner and of leading to his condemnation. In order to show how little assistance medical evidence can afford on these occasions, we may suppose a very possible

case: two individuals may go out on the water in an open boat,—one of these persons may voluntarily throw himself into the water,—he may accidentally fall out of the boat, or lastly, he may be pushed overboard by his companion, and be drowned. The body is discovered and examined, but how is it possible from the examination, to determine by which of the three events the deceased lost his life?

There have been certain cases in which medical men have considered themselves justified in deciding the question under consideration, by the position in which the body was found, and other points of the like nature. I quote the following from a modern work on Medical Jurisprudence. "In March 1806, a young woman at Little Sheffield, in Yorkshire, made away with herself by breaking a hole in the ice upon a pond, and thrusting her head in, while the rest of the body remained out. This situation," adds the author, "repelled the idea either of force or of accident." Since it was known that the young woman had committed *suicide*, there could have been no difficulty in determining the point; but it is impossible to admit, with the reporter of the case, in the absence of all other evidence, that the situation in which the body was found, repelled the idea of force; for there is no greater difficulty in conceiving that her head had been forcibly put under water than that she should have committed the act herself. If a subject be taken out of water bound hand and foot, we have presumptive evidence of homicide; but this is open to be rebutted or supported by other facts. Orfila lays it down as a rule, that if the subject be a newly born child, we are to presume that it has been designedly thrown into water; but even this rule might lead to the condemnation of an innocent person, if rigorously adhered to. It is certain that in such a case there could be no question of suicide; but it would be more than we are warranted to say, if we affirmed that such an occurrence might not take place *accidentally*, supposing that the question referred to accident or homicide.

With these general remarks upon the subject, I shall proceed to offer a few additional cases to the notice of the reader.

L

In the following case, scarcely a doubt could be entertained as to the fact of suicide, although all positive evidence was wanting.

In October 1829, a female who was an in-patient of St. Luke's Hospital, was found dead in the bath of the Institution. It appears that for some time previously, she had been permitted the accustomed privileges to patients exhibiting indications of convalescence, and had obtained access to the nurse's room, in which the key of the bath was deposited. One afternoon, she secretly possessed herself of this key; and then immediately proceeded to make arrangements for the accomplishment of her purpose. In order to deceive the vigilance of the nurse, who was accustomed to lock the patients up at bed time, she took off her clothes and disposed them about the room in the usual manner, as if she had undressed. She then made up a bundle to resemble the human figure, and placed it inside the bed, filling her nightcap with handkerchiefs. So accurate was the deception, that the other patients who slept in the room with the deceased, readily answered that they were all present. The lunatic, after these preparations, must have stolen cautiously down to the bath. She was found the next morning dead, lying stretched out with her face downwards; the water of the bath was not deep, and indeed, it is presumed, she must have forcibly maintained the position in which her body was found, in order to have effected her purpose. The door of the bath room was locked inside, and the key was found in the deceased's pocket.

Smith observes, in relation to this subject, that, "Some have been drowned in water so shallow as to cover no more than the face,—a situation in which an adult at least could hardly be drowned by external force, though, in peculiar circumstances, we may admit the fact of accident."¹ Let not the medical jurist, however, rely upon the shallowness of the water, as affording a means of solving this important question; for an old and weak person might be readily destroyed in water the depth of which was no more than sufficient to cover the mouth and nostrils,—while even a

¹ Op. cit. p. 298.

strong adult, under circumstances of exhaustion, of intoxication, or where several are combined to murder him, might be easily destroyed in a similar situation.

At the Stafford assizes, for July 1832, George Bayley was tried for the murder of Elizabeth Martin. In one count of the indictment, he was charged with having caused her death by drowning, in another by blows.

It appeared by the evidence, that the deceased and the prisoner had been drinking together at an inn in the neighbourhood of the spot where the murder was stated to have been committed. The prisoner, who had been quarrelling with the deceased, left the inn some time before her, and took the road by which the deceased subsequently passed. It was then late in the evening and nearly dark. Shortly after the woman had left the inn, cries of murder were heard by several persons to proceed from the direction which she had taken. One witness deposed that, in passing along the road about this time, he saw the deceased and the prisoner quarrelling and struggling with each other on a pathway near the banks of a pond which was situated by the side of the road.

On the following morning, the body of the woman was found in the water of that pond, partly floating and partly submerged. Her face was turned downwards towards the bottom of the pond, and *one of her hands was found to be in her pocket*. There were a few marks of violence about her person and her head-dress was very much torn. The pond, it may be remarked, was about two feet in depth; there was a foot of mud at the bottom of it, and the surrounding bank bordering on the pathway, was nearly perpendicular. It is necessary to observe that, when removed from the water, the clothes of the deceased were not muddy.

The medical witness who was examined, stated that he had inspected the body of the deceased, and, from the appearances, he inferred that she had died by drowning. In answer to a question, put by the judge, he said that it was impossible to determine whether the deceased had been stunned or not, prior to submersion: the marks of violence on her person, were of a slight and unimportant character and insufficient to account for death.

The prisoner in his defence, contended that the deceased had accidentally fallen into the pond while in a state of intoxication, and that he was in no way concerned in her death.

The judge, in making his charge to the jury, observed that the circumstance of one hand having been found in the pocket of the deceased, when her body was removed from the pond, was to be regarded as most important. He urged the probability that if the deceased had by mere accident fallen into the water, she would undoubtedly have taken her hand from her pocket to try to extricate herself; and for the same reason, she would also have done this, if she had been pushed into the pond by the prisoner during the struggle. It might have happened, however, that the woman was stunned before falling into the water,—at the same time she might have had her hand in her pocket to protect her money, and, if this were the case, it being impossible for her in a state of insensibility to make any exertion to get out of the pond, her hand would have been found in the position indicated. The judge concluded by calling the attention of the jury to the fact, that there was a foot-path by the side of the pond; and, the bank being steep, that a person in a state of intoxication, might without difficulty have fallen in by accident.

The jury immediately found the prisoner guilty, and he was subsequently executed.

In this case, medical evidence availed but little in the solution of the question. The circumstance of the hand of the deceased having been found in her pocket, seems to prove that she must have fallen or have been thrown into the water while insensible.

Where a strong moral presumption is combined with circumstantial evidence, the decision of the case is not attended with much difficulty.

In January 1831, the body of the Earl of R—— was taken out of the Serpentine river in Hyde Park. An inquest was held, and a verdict of “found drowned” was returned. It was proved that the umbrella of the deceased was lying on the bank of the river near the spot where the body was

discovered, *with the handle directed from the water*. His lordship had been for some time melancholy and apparently uneasy in his mind, and, but a few nights before, he had lost a considerable sum of money at play. There was no reason to believe that this event was the result of accident, for on such a supposition, it is not probable that the umbrella would have been found on the bank of the river; nor would the circumstances allow the belief that his lordship had been violently destroyed. The facts of the case warranted the correctness of the verdict returned by the jury.

Among the cases mentioned, as illustrative of this part of our subject, in most works on Medical Jurisprudence, we find the following, which, although it occurred many years since, nevertheless affords interesting matter for reflection to the practitioner of the present day.

Spencer Cowper Esq., a barrister at law, was tried at the Hertford Assizes, in 1699, for the murder of Sarah Stout, a member of the Society of Friends.

The prisoner arrived in Hertford on the 13th March, and went on a visit to the house of the deceased, who was residing with her mother. Mr. Cowper and the deceased left the house together in the evening, and this was the last time that the deceased was seen alive. On the next morning, her body was discovered in an adjoining pond, which was about five feet in depth. The body when first seen, was floating, being about five or six inches below the surface of the water, while some of the clothes were on the surface. The right arm of the deceased was lying against a stake,—the eyes were open and some little froth issued from the mouth and nostrils. The surgeons who gave evidence at the inquest, did not open the body; they said that they found externally, a spot behind the ear, and a stagnation of blood on the breast below the collar-bone; but these appearances did not differ from those commonly seen in the drowned. The jury returned a verdict of suicide in a fit of temporary insanity.

Some reports having been circulated to the prejudice of Mr. Cowper, who was the last person seen in company with the deceased, the body was disinterred on the 28th April, *six weeks after burial*, and was now for the first time sub-

mitted to a regular anatomical inspection. It was examined by nine medical men, and from the statements made by them, Mr. Cowper was accused of having strangled the deceased, and of having afterwards thrown her body into the water.

The evidence for the prosecution was entirely medical:—it was of the following nature :

The face and neck were black and discoloured, so as to prevent the recognition of any marks of violence. The stomach was much distended with gas, *but neither this organ nor the lungs contained any water.* From this fact, the greater number of the witnesses affirmed that the deceased had not been drowned : and they further declared that all bodies which went into water alive and were drowned, had water in them. One swore that when a person was thrown in dead, water could not enter because all the parts would be closed and contracted. When asked whether they could expect to find water, even if it had originally existed, so long as six weeks after interment, they answered,—that if water had ever been in the stomach, it would have caused a fermentation and a rotting of the lungs and viscera. *The absence of putrefaction from these parts, proved to them that water had never existed within the cavities.* One witness, Mr. Dimsdale, declared that if a body had been drowned a fortnight, the bowels would be so rotten that there would be no coming near it. This gentleman also contended that if water had existed, it could not get out after death, but by putrefaction; and as there was no putrefaction in this case, it was clear to him that water had never been present in the stomach, and therefore, the deceased had not died by drowning.

The circumstance of the body having been found floating in the pond, was an additional proof, in the minds of some of the witnesses, that the deceased had been thrown into the water after death. Thus it was said, all that are drowned living, will sink in water as soon as they are dead ; while the body of a person who is killed in some other way, and put into water after death, will float. To corroborate this view, an experienced *seaman* was brought forward, who swore that he had been engaged in many battles and shipwrecks, and

had uniformly observed that when a dead body was thrown into water it floated, while if a person died in water, his body invariably sank. Among other illustrations brought forward by this witness, and admitted as evidence, was the following. A man had both his legs shot off in a sea-fight and died instantly; his legs and body were then thrown overboard, his legs sank, but his body floated. This closed the case for the prosecution.

Many eminent men were called to give evidence in the defence, since the whole weight of the charge against the prisoner, rested on the correctness of the opinions advanced by those professional witnesses who were summoned for the prosecution. It was urged in his defence, that the presence of water in the stomach, was accidental and that it was not always found in cases of drowning. William Cowper, the celebrated anatomist, considered that its absence might be explained by supposing that the deceased had died speedily and before any quantity of water had been swallowed; or it might have drained out of the body after its removal. Sir Hans Sloane stated it as his opinion, that the water after six weeks' interment of a body, might have become absorbed and dissipated. The statements of the witnesses for the prosecution, regarding the alleged power of water to accelerate putrefaction were denied by those who appeared for the defence. These witnesses also denied that the buoyancy of the body could afford a proof of the manner in which the deceased lost her life. They declared that dead bodies placed in water, necessarily sank, if there were no distension of their parts to buoy them up. The floating of a dead body, whatever might be the cause of death, they considered to be accidental; and in this case, they attributed the floating of the deceased's body partly to the dress and partly to the circumstance of its having rested against the stake. The surgeons who saw the deceased soon after her removal from the water, affirmed that the injuries observed on the person, were unimportant and, in their opinion, of accidental origin. The jury acquitted the prisoner.¹

¹ State Trials.

In examining the evidence adduced to support the charge of murder against the prisoner in this singular case, we cannot but perceive its weakness and inconsistency. The medical witnesses for the prosecution, seem to have supposed that unless they could establish that the deceased had not been drowned, the charge must fall to the ground. In this point of view, their evidence presents a curious picture of the influence of prejudice over the human mind ; for it is clear that the deceased might have been murdered by the prisoner forcing her into the water, as well as by his strangling her and throwing in her body afterwards. Why, therefore, the witnesses should have considered it necessary to disprove the presumption of drowning as a preliminary step, is inconceivable. No evidence was given to render it even remotely probable, that the deceased had been strangled ; for the surgeons who saw the body when recent, and, who were the best fitted to judge, deposed that there were no marks of violence about the neck indicative of strangulation. The witnesses for the prosecution, however, seemed to be bent on proving, rather that the deceased had not been drowned, than that she had been strangled, leaving the fact of strangulation to be inferred from the presumed negative evidence which they adduced. There is but little doubt that the deceased died by drowning :—the absence of water from the stomach and the floating of the body proved nothing to the contrary. The absence of water, might be accounted for in many ways, and the floating of the body was a purely accidental occurrence.

V. Buoyancy of the human body living and dead. Great importance, it will be seen, was attached to this question on the trial of Spencer Cowper ; and as it may possibly become again agitated on trials for murder by drowning, it will be proper that the medical jurist should furnish himself with a knowledge of the prevalent opinions on the subject. Many conflicting statements have been made, concerning the specific gravity of the human body in water ; but it appears now to be the general opinion, that in a healthy state, and with the chest full of air, the body is somewhat

lighter than water. Dr. Arnott¹ observes that a human adult of ordinary size, will naturally float on water with a bulk of about half the head above the surface; but it is probable that most persons would sink lower than this unless they made some exertions with their hands and feet to support themselves in the medium. Much will depend on the form and size of the chest, as well as on the quantity of adipose matter beneath the skin. A person, whose chest was small and contracted, would commonly sink; while another whose chest was large and expanded, would be supported in water without much difficulty. In like manner, one who is thin and emaciated, would be heavier than the volume of water displaced by his body; while the body of another who was loaded with fat, would, *cæteris paribus*, be very buoyant. Müncke mentions the case of a Neapolitan monk, PAOLO MUCCIA, who was so corpulent that he possessed to a remarkable degree the faculty of insubmersibility.² On experiment, the volume of water displaced by the body of this monk, was found to weigh three hundred and thirty Neapolitan pounds, while his body weighed three hundred pounds;—consequently, he weighed thirty pounds less than his bulk of water, and floated with the greatest ease. If the chest be once emptied of air, as by a deep expiration, the body under common circumstances, will always sink. It is thus that divers, in the exercise of their art, are compelled, when they have dived to a great depth, to exert themselves in order to rise to the surface: for the force with which they plunge into the water, combined with the pressure of the water on the thorax at the depth to which they descend, causes a forcible expulsion of air from the lungs, which is sufficient to render them heavier than that fluid. Many persons who fall into water are observed not to rise to the surface: in some of these cases, probably the shock may induce syncope, or terror may incapacitate a person from making exertions for this purpose;—but in others, it is probable that the individual may fall in at the

¹ Elements of Physics, p. 273.

² Handbuch der Naturlehre, p. 124. Heidelberg, 1829.

moment of making a full expiration; and at a time, therefore, when his body is heavier than its bulk of water. In such a case, unless some exertions be instantly and effectively made, his body will remain below the surface. In order to shew the influence which the pressure exerted by water on the thorax, may have over the buoyancy of the human body, Dr. Arnott relates an incident of which he was an eye-witness. A well-formed West Indian negro fell into the calm sea from a yard-arm eighty feet high. The velocity with which the man descended into the water, was so great that he was at once carried down to some depth. His chest must have become violently compressed, and probably the shock stunned him; for, although he was known to be an excellent swimmer, he only moved his arms feebly once or twice, and was then seen gradually sinking for a long time afterwards, until he disappeared as a black and distant speck in the unknown regions of the abyss.¹

From these remarks on the buoyancy of the living body, it will be readily understood, that unless there be some accidental circumstances to support it on the surface, a *dead* body will always sink in water. It will be in the state of a living body, in which a full and complete expiration has been performed. The manner in which the deceased *dies*, does not at all affect the result; although it is asserted by a few writers, that the bodies of persons strangled, will float more readily in water, because it is presumed that air is retained within the chest by the application of the rope or ligature.² This was the opinion of Dr. Garth, who gave evidence on the trial of Spencer Cowper, but it is founded on a very false view of the manner in which death takes place by hanging or strangulation. The case of Admiral Carraccioli, has been considered by some, to prove that the thorax possesses a power of sustaining the body in water under these circumstances. This unfortunate person, was hanged in pursuance of the sentence of a Court-Martial, and his body was afterwards thrown into the sea in the usual

¹ ARNOTT, Op. Cit. p. 275.

² MALE. Jurid. Med. p. 186.

manner. About a fortnight after the execution, while the king of Naples was walking on the deck of Lord Nelson's ship, he was heard to exclaim suddenly, with a cry of horror, "*vien! vien!*" The Admiral's corpse, breast-high, was seen floating towards the ship!

Dr. Paris endeavours to explain this, by supposing that the admiral's body was in a state of rigidity when thrown overboard, and that the position of the weight might have become subsequently altered.¹ It is not likely, however, that the body remained rigid for a fortnight after death; and the less so, when we consider that it could only have risen to the surface in consequence of the generation of gas within the cavities by putrefaction. The feet may have been kept down by the weight; but we must receive with some limitation, the description given by the eye-witnesses of the manner in which the upper part of the body of the deceased was floating. The fact itself proves nothing with regard to the supposed greater buoyancy of strangled subjects; for as it will be hereafter stated, air is extricated from the lungs in death from hanging or strangulation, as well as in death from drowning.

When a dead body has remained for a few days in water, it commonly rises to the surface in consequence of the gases formed by decomposition.² These chiefly collect within the abdomen, the parietes of which become considerably distended; and hence it is this part of the body which is usually seen floating on the surface, the upper and lower extremities and head being dependent. If, however, putrefaction has gone on to any great extent, the extremities will float. Should the parietes of the abdomen give way, the body will again sink; and in the course of a few days it may be again seen on the surface in consequence of the collection of another portion of gas within the cavities. The time at which a dead body will rise after drowning, cannot be specified; it is liable to vary according to all those circumstances which influence the progress of putrefaction in water.

¹ PARIS and FONBLANQUE, Vol. II. p. 42.

² These gases, according to M. Guntz, consist of carburetted hydrogen, of sulphuretted hydrogen, phosphuretted hydrogen, and of carbonic acid:—the carburetted hydrogen being in excess, and the carbonic acid in small proportion. ORFILA. *Traité des Exhumations*. Vol. II. p. 71.

The medical jurist must not forget that the clothes worn by the deceased, may affect the buoyancy of the body. The dress of females, is generally sufficient to keep the body on the surface or at a very little depth below it.

VI. *Putrefaction in water.* Some allusion has already been made to the changes which the skin of a dead body undergoes in water (p. 111); but there are other changes which take place in the different organs and cavities, and these are liable to be modified by contingent circumstances, somewhat similar to those described in speaking of putrefaction in air (vide page 88 et seq.). Age, sex, and constitution, have equal influence in water. Orfila states that the body of a newly born child, will become as much decomposed after having lain a month in water, as the body of an adult, in a period of six or eight months. Female subjects putrefy in water more rapidly than male subjects, and in the former, the formation of adipocere is observed to take place earlier. A large quantity of adipose matter on the body, may accelerate decomposition by causing the subject to rise sooner to the surface, where it is submitted to the combined influence of heat, air, and moisture. In subjects remarkable for obesity, adipocere is abundantly, and comparatively speaking, speedily formed. The decomposition from which this peculiar substance results, has been already explained; and the only circumstance which now requires to be noticed in regard to it, relates to the period at which it is commonly met with in drowned subjects. This is a question which has been raised in a Court of Law to determine the probable period at which the death of a party took place. From the observations of Orfila, it would appear that this substance is not found in the human adult subject, until after it has remained from three to four months in water: his observations, however, were made during winter.¹ The change was first observed to be completed in the cellular tissue of the face, especially about the cheeks and orbits and the skin of the lower part of the abdomen. The experiments of Dr. Gibbs shew that this change goes on with greater rapidity in running water, than

¹ Traité des Exhumations. Vol II. p. 78.

in that which is still.¹ The shortest time within which this gentleman found the conversion to be completed, was a month, and upon this fact a very singular case of survivorship was decided, which will be related in a future part of the work.

It seems to be established that the dead body, where death has taken place prior to submersion, will putrefy more rapidly than one in which death has resulted from drowning. That there should be any marked difference, however, it is necessary that the dead body should have been exposed some time to the air, before being cast into water. A more important influence is ascribed to the variable temperature of water at different depths. The temperature of water being dependant on the temperature of the atmosphere, it is obvious that in summer those strata which are near the surface, will hasten putrefaction; while if the subject remain below and the water be deep, the putrefactive process will become considerably retarded. Let this circumstance be borne in mind by the witness, when he attempts to form an opinion relative to the time at which submersion may have taken place; for it is certain that a subject, floating near the surface, will become more decomposed in a few days, *cæteris paribus*, than one which has lain at the bottom of a deep river or pond, in the course of a few months. From this, we may draw the conclusion, that a body will putrefy more readily in a pond than in a river, and again more readily in a river, than in the sea, all other circumstances being equal. Lastly, if the body of a drowned subject be mutilated, its decomposition will be accelerated. This is a point also worthy of the consideration of the medical jurist, when he is required to decide on the nature and extent of marks of violence which are supposed to have been inflicted during life. The blood which is extravasated in these cases, becomes much more speedily decomposed when lying loosely within the cells of the cellular membrane, than when it is contained within its proper vessels. In consequence of this, all contusions, ecchymoses, or injuries of the like nature, become

¹ Philosophical Transactions, 1794.

considerably extended in a drowned subject, where it has been removed from the water and allowed to remain exposed to the air for a short time. It is evident, therefore, unless attention were paid to this circumstance by the medical examiner, he might form a very erroneous idea of the degree of violence inflicted during life, and, by his evidence, mislead the jury. The cases of Carwardine and Sarah Stout, present an instructive commentary on the importance to be attached to these changes in the bodies of the drowned. In avoiding this error, the witness must not, however, run into the opposite extreme, and consider that such appearances may result purely from the process of decomposition. His judgment as a professional man, must here assist him : for although he may admit that a contusion becomes increased in extent by putrefaction, he will scarcely be justified in allowing that such an appearance can be a simple result of that process.

The changes which the different organs experience in water, are subject to great variation. When there is a tendency for adipocere to form, the muscles gradually lose their colour, become thinner and of closer texture and are slowly transformed into this substance : they then undergo no further alterations. All the muscles are not equally subject to this change. In those cases where the conditions for putrefaction freely exist, the muscles slowly acquire a dark greenish colour, lose their consistency, and are gradually washed away from the bones. The ligaments and tendons are in the course of time reduced to a white pulpy mass, while the cartilages, which are observed first to become yellow, require at least a year's maceration before they are converted into the same sort of substance. The bones, according to Orfila, sometimes acquire a reddish tint, sometimes they become green, and at other times, black. These changes of colour are chiefly remarked in the long bones, and in order that they should take place, it is necessary that they should lie for a long period and be in immediate contact with water. After a very lengthened residence in water, the bones are observed to become brittle.¹

¹ ORFILA and LESUEUR. *Traité des Exhumations*. Vol. II. p. 100.

CHAPTER IV.

HANGING. STRANGULATION. SUFFOCATION.

HANGING,—cause of death,—apoplexy or asphyxia,—pressure on the nerves and vessels of the neck,—displacement and fracture of the cervical vertebræ,—rapidity with which death ensues,—cases of resuscitation.—Post-mortem appearances,—external and internal,—whether the individual was hanged during life or after death,—mark produced by the cord,—signs of murder about the person,—whether the hanging resulted from accident, suicide or homicide,—cases of accidental hanging,—cases in which murder may be committed by hanging,—marks of violence on the body voluntarily or accidentally inflicted,—supposed evidence from the impression of the cord,—from laceration of the muscles and fractures of the vertebræ,—from the position of the body,—cases,—case of the late Duke de Bourbon.—**STRANGULATION**—post-mortem appearances,—whether death resulted from strangulation or not,—case of Sir E. Godfrey,—of Sir James Standsfield,—of Harris.—Whether strangulation was the result of accident, of suicide, or homicide,—remarks on accidental strangulation,—case of Beddingfield,—suicidal strangulation,—homicidal strangulation,—case of Dr. Clench.—**SUFFOCATION**—causes of death by,—action of carbonic acid on the system,—of confined air,—of the sulphuretted hydrogen gas.

HANGING.

I. *The Cause of Death.* A variety of causes have been assigned to account for death where an individual perishes in consequence of having been suspended by a rope or ligature placed around his neck. It was formerly a common subject of belief that death, in these cases, resulted from apoplexy. This opinion is still maintained by many authorities; but the majority of those who have paid much attention to the circumstances accompanying death in hanging, now look upon it to be fully established that it arises from the interruption to the function of respiration, or, in other words, that it is a simple result of asphyxia.

It is not difficult to understand why a belief should have universally existed that apoplexy was the immediate cause of death in hanging; for the constriction to which the vessels of the neck were subjected by the pressure of the cord, and the cerebral congestion frequently observed on a post-mortem examination of the body, would naturally give rise to it. Since, however, a better knowledge has existed among physiologists respecting the phenomena of respiration, the old opinion has been banished. The following experiment which has been performed by several who have interested themselves in these inquiries, is generally quoted to shew that the obstruction to the exercise of the respiratory function alone, is the real and essential cause of death. "A dog was suspended by the neck with a cord, an opening having been previously made in the trachea below the place where the cord was applied, so that air could pass into the lungs nearly as freely as in ordinary respiration. After hanging in this state for about three quarters of an hour, during which time the circulation and the breathing went on as usual, the animal was cut down, and it did not appear to have suffered materially from the operation. The cord was then shifted from above to below the opening which had been made into the trachea, so as totally to prevent the ingress of air into the lungs, and the animal being again suspended, was in a few minutes completely dead."¹

We are not however justified in inferring from the result of this experiment, that death, in all cases of hanging, takes place in so simple a manner. In violent hanging, as in the execution of a criminal, the weight of the body, the force with which it falls, and the closeness with which the ligature is adapted to the neck, will give rise to differences in the phenomena of death. In most, if not in all of these cases, we must consider that the constriction of the cord, may operate not only by closing the trachea, but by preventing the free transmission of blood through the carotids, as well as by impeding its return to the heart through the jugular veins. It has been frequently observed that in the execution

¹ *Cyclopædia of Practical Medicine*, Art. *Asphyxia*.

of criminals, death does not constantly ensue within the same period of time; and we may probably best explain this fact by a reference to the greater or less degree of constriction produced by the ligature. If the rope should press upon the larynx or above that organ, the occlusion of the air-passages will not be so complete as if it pressed upon the trachea immediately below the cricoid cartilage. A slight degree of respiration might, in the former case, continue for a short interval, by which the sufferings of the person would be prolonged; while in the latter, death would be immediate. If the trachea be in part ossified, the pressure of the cord becomes less perfect and death is likewise protracted. The circumstance of death being retarded where the pressure on the trachea is incomplete, and of its being accelerated under a contrary condition, are facts which seem to prove that the pressure exerted by the cord on the vessels of the neck, is a point of secondary importance in the phenomena of death by hanging.

We find it stated in certain works, that the immediate cause of the stoppage of respiration, is the pressure on the nerves which are subordinate to that function.¹ Sir B. Brodie is represented as believing, that although an animal may not immediately perish from the effects of the pressure on the nerves of the neck, yet the consequences may be afterwards serious or even fatal.² This physiologist passed a ligature under the trachea of a guinea-pig, and tied it tightly on the back of the neck. The animal was uneasy, but nevertheless it breathed and moved about. The ligature was removed at the end of fifteen minutes, but the following morning the animal was found dead. Sir B. Brodie hence inferred the probability that the animal had died from an injury inflicted on the nerves of the eighth pair. Whether we admit this inference as being correctly drawn or not, we must consider it as very improbable that, under the circumstances in which hanging generally takes place, the cord can exert any pressure on the pneumo-gastric nerves sufficient

¹ BECK'S Elements of Med. Jur. p. 281.

² PARIS and FONBLANQUE. Med. Jur. Vol. II. p. 44.

to produce death, either at the time or after the lapse of any interval, supposing the person should be resuscitated. In the greater number of cases of suicidal hanging, which are commonly unattended with much violence, the pressure on these nerves cannot obviously exist; and in violent hanging the projection of the anterior parts of the neck must suffice to prevent these slender nervous cords from becoming exposed to such a degree of compression, as directly to impede the exercise of their functions.

There is an occasional cause of death in hanging, which appears to have been first brought to the notice of the profession by the celebrated Louis. This eminent surgeon having remarked that, in public executions, death sometimes took place with great rapidity, and in other cases more slowly, was led to inquire into the manner in which the executioner performed his duty. He found that in the cases of rapid death, the executioner was in the habit of giving a violent rotatory motion to the body of the criminal at the moment it was turned off, by which a displacement of the dentiform process of the second cervical vertebra took place, so that the spinal marrow became thereby suddenly compressed. This cause of death, although now generally admitted, must be extremely rare:—it is only likely to be observed in very corpulent subjects where a long fall is given to the cord, and where much violence has also been at the same time employed by the executioner. M. de la Fosse¹ considers, from the experiments which he has undertaken on the subject, that, in violent hanging, the dentiform process of the second cervical vertebra, is much more likely to be fractured than to become displaced, and he actually found this to be the case in an executed criminal. On an examination of the body of this subject, he discovered that the two first cervical vertebræ had been completely separated from the remainder of the spinal column by the rupture of the intervertebral substance, and that they were firmly attached by their ligaments to the occipital bone. The dentiform process and body of the second vertebra were

¹ MAHON. Méd. Lég. Vol. III. p. 57.

detached from the bony ring, and were connected as usual with the anterior arch of the atlas. The spinal marrow had become compressed by the fractured portions of the vertebræ. Probably further observations would shew that the injury to the spine is not always of the same nature, and that fractures of the vertebræ are really more frequent than simple luxations of the odontoid process; but, in the mean time, we must admit that such injuries may occur in hanging, and that when they do occur, death must be very sudden. Of course, in these instances, all attempts at resuscitation would be fruitless.

Death appears to take place very rapidly in hanging, and without causing much suffering to the individual. When the suspension of the body has only continued a few minutes, it has often been found impossible to restore life. Some very extraordinary cases of resuscitation have been reported, which are about as credible as those already referred to, in speaking of resuscitation from drowning. The following is a case in which the attempt was made unsuccessfully, but with very fair hopes of success. I have extracted the account of it from Smith's work on Forensic Medicine.¹ "A man of the name of Gordon, was executed at Tyburn, in April, 1733. Mr. Chovet having, by frequent experiments on dogs, discovered that opening the windpipe would prevent the fatal consequences of the halter, undertook to save Gordon, and accordingly made an incision in his windpipe, the effect of which was, that when Gordon stopped his mouth, nostrils and ears, for some time, air enough came through the opening to allow of the continuance of life. When hanged, he was observed to be alive after all the rest were dead; and when he had hung three-quarters of an hour, being carried to a house in the Tyburn road, he opened his mouth several times and groaned; and a vein being opened he bled freely. No further attempts succeeded in eliciting any other signs of life. The want of success probably was to be attributed to the great weight of the man; by which, the compression of the vessels of the neck, must have become more effectual than

¹ Appendix, p. 561.

in ordinary cases, and perhaps at the same time the opening into the trachea was not sufficiently free."

The time at which death ensues, must vary according to the degree of constriction, the position and nature of the cord or ligature, the length of the fall, the weight of the individual, and, lastly according to the concomitant injury done to the parts about the neck. These modifying circumstances require only to be enumerated, to have their influence in retarding or accelerating death, fully understood. That death by hanging is not attended with much pain, appears to be rendered certain from the accounts given by those who have been hanged and subsequently resuscitated. It is related by Lord Bacon in his *Historia Vitæ et Mortis*, that a friend of his, who was particularly anxious to ascertain whether criminals suffered much pain in undergoing the sentence of the law, on one occasion suspended himself by the neck, having for that purpose thrown himself off a stool on which he supposed he could readily remount, when he had carried his experiment sufficiently far to satisfy his curiosity. The report goes on to state that the loss of consciousness which followed would have led to a fatal termination of the experiment, had not a friend accidentally entered the apartment in time to save the life of the adventurous experimentalist. Foderé relates a similar incident of one of his fellow students. This young man, after an argument respecting the cause of death in hanging, resolved personally to gratify his curiosity by passing a ligature round his neck and attaching it to a hook behind the door. To accomplish this he had raised himself on tip-toe, and now gradually brought his heels to the ground. He soon lost all consciousness, but was cut down by a companion who discovered him in a state of insensibility very soon after the commencement of the experiment, and by the prompt application of remedial measures he was finally recovered. From cases of this description, we learn that the first effect experienced in hanging, is the appearance of a dazzling light before the eyes, accompanied by tingling in the ears. These sensations are, however, momentary, for insensibility and death rapidly close the scene.

II. *Post-mortem appearances.* In most medico-legal works, the following are the external characters of the body which are laid down as indicative of hanging. Lividity and swelling of the face, especially of the lips which appear distorted. The eye-lids are swollen and of a bluish colour;—the eyes, red, projecting forwards and sometimes partially forced out of the orbital cavities;—the tongue enlarged, livid and compressed between the teeth, or frequently protruded. A sanguineous froth about the lips and nostrils. A deep and ecchymosed impression around the neck, indicating the course of the cord, the skin being sometimes excoriated;—laceration of the muscles and ligaments in the hyoid region;—laceration or contusion of the larynx, or of the upper part of the trachea. There are also commonly circumscribed ecchymosed patches, varying in extent about the upper part of the trunk and the upper and lower extremities with a deep livid discolouration of the hands. The fingers are generally much contracted or firmly clenched. The urine, the fæces, and the seminal fluid, are sometimes involuntarily expelled at the moment of death. It is worthy of remark, that the body is, *cæteris paribus*, a much longer time than usual in parting with its animal heat.

Internally we meet with the appearances described under the head of asphyxia. The right side of the heart and the great vessels connected with it, are commonly distended with blood. But when the inspection has been delayed for several days, this distension may not always be observed. Morgagni states that on making an inspection of the body of a person who had been hanged, about two hours after his death, he found the lungs and right cavities of the heart, gorged with blood; but on looking at the body, the following day, these appearances were no longer to be seen. He explained the phenomenon, by supposing that the blood had become liquefied and had diffused itself more generally throughout the vascular system; for not a vessel had been opened by which it might have escaped. The vessels of the brain are commonly found congested, and, in some rare instances it is said, extravasation of blood has been met with on the membranes and in the substance of the organ. The venous congestion of the cerebral vessels, is not, however, greater than in other

cases of asphyxia, and hence, we can no more infer from this state of the vessels, that apoplexy is a common cause of death in hanging, than we can in death from suffocation, drowning, or any other variety of asphyxia. In most cases, there is increased vascularity of the substance of the brain, so that on making a section of the hemispheres to produce the centrum ovale, a greater number of bloody points, than usual, will appear. In addition to these morbid changes, a mucous froth, sometimes of a sanguineous hue, has been described by some to exist in the trachea; but this is only likely to be met with in cases in which the obstruction to respiration, has been incomplete. A more important circumstance has been noticed by Dr. Yelloly, namely that, in examining the stomachs of five criminals who had been hanged, he found great congestion in all; while there was blood extravasated and coagulated upon the mucous membrane in two. Such an appearance might it is obvious be attributed to the action of some irritant substance in a suspicious case.

According to Dr. Roget,¹ the lungs, in persons who have been hanged, are remarkably distended with air, so that they do not readily collapse when the thorax has been opened. Dr. Goodwyn, it appears, made some experiments on the quantity of air contained in the lungs of such subjects, compared with the quantity contained in those organs, under death from ordinary causes. From these experiments he inferred, that there was twice the usual quantity of air in the lungs of those who had been hanged. This great difference he explained, by supposing that persons who were hanged, were under the influence of fear, and, therefore, they would naturally make a deep inspiration before the cord was tightened on the neck; and he further supposed that the pressure of the cord on the trachea, when the body was once suspended, became immediately so great that the air could not again be expelled. Now a distended state of the lungs is by no means universally seen in death from hanging, and when these organs are distended, the distension appears to

¹ Cyclopædia of Practical Medicine. Art. Asphyxia.

proceed rather from the quantity of blood, contained within their substance, than from the quantity of air within the air-cells. In animals which have been hanged, I have frequently met with these organs in a collapsed state; I have also observed this in an executed criminal, and in a case of suicidal hanging. The explanation given of this supposed condition of the lungs, is too artificial, even if it were admitted to be a probable concomitant of death by hanging. It seems to be a point as well founded, as it is now generally admitted, that, in this kind of death, there is commonly an actual expiration of air which may vary in degree in different subjects. The sanguineous congestion of the organs will depend on the slowness or rapidity with which death has ensued: the greatest degree of congestion existing where death has taken place slowly.

In all cases, it will be proper to examine the deep-seated cervical region, to ascertain whether there has been any fracture or displacement of the cervical vertebræ.

The first medico-legal question which presents itself for our consideration, is :—

Whether the individual was hanged during life or after death?

Orfila has truly remarked that there are few questions in Medical Jurisprudence, which, considering its importance, have been more neglected than this. The signs of hanging which have already been described, have been chiefly relied on by jurists and physicians, as evidences of the hanging having taken place when the individual was living; while there is nothing more certain, from what is now known concerning them, that if this question were to be decided in all cases solely by their presence or absence, the greatest errors would arise. In hanging during life, many of them may be entirely absent, and some are observed to take place only under certain conditions. Foderé, Beck, Male, Smith, and other authors, lay it down as a positive axiom that when an individual has been hung alive, there will be a *red* or *livid* depressed circle in the course of the cord which has been

used for suspension. Foderé even goes so far as to say, that where this lividity or redness, among other signs, is absent, we are justified in inferring that the hanging took place after death. Dr. Roget appears to be also of the same opinion ; for he speaks of " a livid depressed circle" being always evident when the person has been hanged up alive.¹ If these writers had limited their description to those cases of hanging in which much violence was used,—in which the fall was great,—the subject corpulent and heavy, and the ligature small and formed of hard and resisting materials, there would be no objection to the admission of its general correctness ; but such is not the fact,—its application is unrestricted, and we are therefore, in following this doctrine, called upon to believe that where there is no lividity or depression produced by the cord on the neck, the individual has not died by hanging. That this view is wholly unsupported by facts, and directly opposed to numerous observations, will probably be made evident by the illustrations to be brought forward hereafter. In the mean time, we may be permitted to observe, that although in this country, there has been of late years, no criminal investigation by which its incorrectness could be fairly made a subject of exposure,—yet it appears to have been by too confident a reliance upon its correctness, that so much ambiguity was attempted to be thrown on the circumstances accompanying the death of the late Duke de Bourbon in France.

We will, however, now proceed to review the appearances of hanging, and see to what extent they can assist us in our inquiry. It is chiefly to the observations of M. Esquirol² that we are indebted for a refutation of the erroneous statements which have been put forth on the subject. This physician published, some years since, a series of cases of suicidal hanging, the details of which are very instructive. It is unnecessary to relate the particulars of these cases : the conclusions to which they lead will for the present claim our attention.

¹ Cyclopædia of Practical Medicine. Art. Asphyxia.

² Archives Générales de Médecine, 1823.

Lividity and swelling of the face have been described among the external signs of hanging. Now where these signs are present and the evidence which they yield is corroborated by the existence of others, we have a strong presumption that the individual was living when hung: for the experiments of Orfila have clearly shewn, that such a condition of the face cannot be produced in a dead subject, although the suspension may take place immediately after death. But the absence of this state of the countenance, does not afford evidence so conclusive as its presence. Thus we cannot affirm, because the countenance is pale and not tumefied, that the individual was not hung while living; for correct observation has shewn that where the hanging was not of a violent nature, and where the ligature employed, was soft, the face was commonly neither livid nor swollen. It would appear also from the report of a case by Esquirol, that the lividity and tumefaction sometimes do not manifest themselves until eight or ten hours after death, hence the practitioner must not be too hasty in forming a decision in cases where this state of the countenance is not in the first instance observed. M. Esquirol thinks that in general, the lividity and swelling of the face in a person who has been hanged, is to be ascribed to the circumstance of the cord or ligature being suffered to remain around the neck after death; but that this explanation is not in all cases applicable, is proved by a reference to some of those reported by himself. The state of the eyes and eye-lids already described is very characteristic of hanging during life, but is not always observed, and, hence, too much importance must not be attached to its absence. The same remark will apply to the occasional protrusion of the tongue. Belloe observes that the protrusion of this organ, will depend on the position of the cord. If this should press above the os hyoides, the tongue will be drawn backwards into the mouth; if below the cricoid cartilage, it will most probably become protruded by the drawing upwards of the laryngeal apparatus.

Among all the signs of death by hanging, *the impression produced by the cord or ligature*, has been dwelt on as

affording the most conclusive evidence. Some remarks have already been made upon this subject, tending to shew that too great a reliance has been hitherto placed on the production of an ecchymosis or lividity in its course. In eleven cases out of twelve reported by M. Esquirol, there was neither lividity nor ecchymosis to be seen, and in one or two cases, there was scarcely any depression of the skin. M. Albin Gras,¹ has lately described another in which there was neither lividity nor ecchymosis in the course of the ligature; and within a recent period, I have seen two instances of death by hanging, where no ecchymosis whatever had been produced by the cord. It is true that the whole of these were cases of suicidal hanging, but it is precisely in such cases as these, that the question which we are now discussing is liable to be raised; and, therefore, the greater is the necessity for doing away with that generally prevalent opinion concerning the constant production of ecchymosis by the ligature. During the last year, even in the body of an executed criminal, I had occasion to witness the entire absence of ecchymosis, except in one spot where the knot in the cord had produced a slight degree of contusion. It is, indeed, more than probable, that the production of ecchymosis by the suspending material, in suicidal hanging, is the exception to the rule. In the cases reported above, as well as in those which I have had an opportunity of examining, the skin of the neck where the compression had been produced, was dry, horny, and somewhat of the colour of parchment; it presented that appearance which the cutis is known to acquire, when it has been deprived for a few days of a portion of the epidermis, and indeed sometimes the cuticle has been partially abraded. In the bodies of executed criminals, it is rare to see a depression all round the neck, for there are certain parts which, by their prominence, protect others from the influence of the cord; while in cases of suicide, where a handkerchief or an apron has been employed as a means of suspension, there is seldom any great degree of depression to be seen in the skin. Orfila in experimenting upon recently dead subjects,

¹ Annales d' Hygiène Publique et de Médecine Légale. Janvier, 1835.

found that the cord would produce a mark similar to that, observed in persons who had been hanged while living. He does not state whether in these experiments any ecchymosis was produced by the cord or not; but he compares the effects of the ligature on the skin and subjacent cellular tissue, to those witnessed generally in cases of suicidal hanging. He found also that hanging after death would produce this appearance whether the subject at the time was cold or warm. It is, however, by no means improbable that the same degree of violence which would produce an ecchymosis in the course of the cord during life, would suffice to produce it in a subject *immediately* after death. The difficulties attendant on the performance of such an experiment, are obvious.

From these remarks, then, we may be permitted to infer, that where there is very decided ecchymosis in the course of the cord, the hanging took place while the individual was living,—that where there is no ecchymosis, as probably in by far the largest proportion of cases, we are not justified in declaring that the hanging took place after death; since it commonly requires an extraordinary degree of violence to produce this ecchymosed state of the skin. But at the same time, in the absence of ecchymosis from the depression produced by the cord, we must look for other corroborative signs before we can draw the presumption that death was caused by hanging. If we should discover any rupture or laceration of the muscles in the hyoideal region, or any fracture or displacement of the cervical vertebra, we are to determine whether these injuries were inflicted before or after death. In the former case, the violence required to effect the injury, would give rise to extensive ecchymosis or contusions in the neighbourhood of the parts. It is scarcely necessary to remark that there are no appearances of the *internal* organs, which can assist in the solution of the question now under consideration; since venous congestion which is the most striking of these, is common to all the varieties of death by asphyxia.

Let us suppose that the medical jurist is required to determine a question of this kind. The deceased is found

hanging,—the face presents none of the common characters of this form of death, and the course of the cord is not indicated by any ecchymosed line or any other marks which would lead him to believe that suspension had taken place during life. It will obviously be his duty, under these circumstances, to determine whether there be any indications of violence about the person, internally or externally, sufficient to account for death; for it is possible to conceive that a murderer may suspend his victim after having destroyed him, in order to give the appearance of the death of the party having resulted from suicide. Deveaux¹ reports a case illustrative of this point. A female of the town of Mantes, was found suspended to a beam in a barn. From the absence of all the marks of hanging about the face and neck of the deceased, a careful examination of the body was made. In the course of the inspection, a small penetrating wound evidently inflicted by a round instrument, was discovered on the right side of the chest, but in great part concealed by the mamma of that side. On tracing this wound, it was found to pass between the fifth and six ribs, completely perforating the heart from the right to the left side. A considerable extravasation of blood had taken place internally, which had been the cause of death. It was therefore evident from the result of this examination, that the deceased had been killed, and her body suspended after death. Foderé refers to a case in which an individual was found hanging under somewhat similar circumstances, and, on examination it was discovered that death had been caused by the administration of poison,—the body having been subsequently suspended.² Circumstantial evidence has more than once assisted in clearing up a doubtful case. Louis states that on removing the body of a man who was found hanging, the rope was found to be clotted with blood. This simple circumstance led to further investigation, by which it was discovered that the person had been murdered, and his body afterwards suspended.

¹ Rapports en Chirurgie.

² Op. Cit. Vol. III. p. 154.

A question very closely allied to that which we have been considering, is the following :—

Whether the hanging be the result of accident, of suicide, or of homicide ?

Most medico-legal writers have passed over the subject of accidental hanging, probably believing it to be impossible. In the sense commonly implied by the term, it is certainly unusual, but although rare, it is a possible occurrence. Dr. Smith, the only medical jurist who has taken any notice of it, quaintly remarks, that people rarely have occasion to fasten one end of a rope around their necks, and the other to a fixed point, unless with some design. He mentions a case, however, which occurred some years since in Northamptonshire, in which a girl of the age of thirteen, was hanged by pure accident. She was swinging in a brewhouse, and near the rope used by her for that purpose, was another for drawing up slaughtered sheep. In the course of the exercise, her head got through a noose of this second cord which pulled her out of the swing and kept her suspended at a considerable height, until dead.¹

The following case was communicated to me by one of my pupils. In December 1833, an inquest was held in the neighbourhood of London, on the body of a boy aged ten years. It appeared in evidence that he had been playing with a child eight years old, who was the only witness of his death. The deceased had been amusing himself in swinging by fastening a piece of plaid gown to a loop in a cord which was suspended from a beam in the room. In the act of swinging he raised himself up, and gave himself a turn, when the loop of rope suddenly caught him under the chin, and suspended him until life was entirely extinct. The boy who was in the room with him, did not give any alarm for some time, thinking that the deceased was at play. The jury returned a verdict of "accidentally hanged." These are the only cases which have come within my knowledge, and it will be seen that the circumstances under which they occurred, were sufficiently decisive of the manner in which

¹ Op. Cit. p. 236.

the hanging took place. Indeed circumstantial evidence must always suffice for the discrimination of accidental hanging, and we have therefore to inquire whether, when an individual is found hanging under circumstances which do not allow of the suspicion of accident, the act is the result of suicide or of homicide.

It has been very truly observed that of all the forms of committing murder, hanging is one of the most difficult, and it is, therefore, but seldom resorted to. In most cases where an individual has been hanged by others, it has been after death, in order to avert the suspicion of homicide. Hence the discovery of a person hanging, affords *prima-facie* evidence of suicide, supposing that it is rendered probable, if not absolutely certain, that death must have taken place in this manner. We must, however, admit that an individual may have been murdered by hanging, and the appearances about his body will not afford the smallest evidence of the fact. The circumstances which will justify the medical jurist in making this admission, are the following. First, where the person hanged, is feeble, and the murderer is a strong healthy man. In such a case, a child, a youth, a female, or an individual at any period of life worn out, and exhausted by disease or infirmity, may be in this way murdered. Secondly, when the person hanged, although usually strong and vigorous, is at the time in a state of intoxication, stupefied by narcotics, or exhausted by his attempts to defend himself. Thirdly, in all cases, murder may be committed by hanging, when many are combined against the individual. With these exceptions, then, the practitioner will be correct in deciding in a suspected case, in favour of the presumption of suicide. Unless the person labour under stupefaction, intoxication, or great bodily weakness, we must expect in homicidal hanging, that there will be evident marks of violence about the body; for there are few who would allow themselves to be murdered without offering resistance, notwithstanding the assertion of Mahon, that some might submit to this mode of death with philosophical resignation, when they saw that resistance was hopeless.

The presence of marks of violence, then, on the body of a

hanged person, is important; and it will be proper for the witness to notice accurately their situation, extent, and direction. Having satisfied himself that they must have been received during life, he will have to consider the probability of their being of accidental origin or not. These marks of violence are not always to be regarded as unequivocal proofs of murder; for it is possible that they may have been inflicted by the individual himself before hanging, and not succeeding in committing suicide by these attempts, he may subsequently have resolved to accomplish his purpose by suspending himself. Let the witness duly reflect on these circumstances before he allows his opinion to implicate any party,—let him consider that a hanged subject, may bear the marks of a gun-shot wound, his throat may be cut,¹ his person may be lacerated or disfigured, and yet before a suspicion of homicide is allowed to be entertained, it ought to be clearly proved that such injuries could not by any probability, have been self-inflicted. The importance of observing caution in such a case will be still more manifest, when there is no ecchymosis produced by the cord, and the face does not present the usual characters of hanging. In these remarks I avoid all reference to presumptive evidence which may, from other circumstances exist against an accused party,—I am merely attempting to estimate the value of the data upon which a medical opinion is commonly founded.

Marks of violence on a hanged subject, may in some cases, be fairly ascribed to *accident*. If the individual have precipitated himself with any violence from a chair or table in a furnished apartment, he may have fallen against articles of furniture and have given rise to lacerations and contusions, especially on the extremities. Again, it is possible to imagine

¹ While this sheet was in the press, I received the report of a case of suicide, which recently occurred at Manchester. A gentleman was found hanging in his bed-room at an inn,—his throat was cut and his dress was much disordered. The door of the room was secured on the inside, and there was not the least doubt of his having hung himself after having failed in the attempt to commit suicide by cutting his throat. If the body of the deceased had been found in an exposed situation, a very different opinion might have been formed respecting his death!

with Dr. Male,¹ that the rope may have broken, and the individual in falling, may have injured his person; but he may afterwards, have had resolution enough to suspend himself again. Such an occurrence may be rare; but when the presence of these injuries is made to form the chief ground of accusation against a party as the murderer, their accidental origin ought not to be lost sight of by the considerate witness. If we suppose the person to have been hanged in a state of intoxication or stupefaction, medical evidence alone will rarely suffice to determine the question of homicide or suicide. The absence of all marks of violence from the person might effectually lull suspicion.

Some medical jurists have thought that the mark left by the cord on the neck, would serve as a proof on which we might depend. Thus it has been said, if the mark be *circular* and placed at the lower part of the neck, it is an unequivocal proof of murder. Such is the opinion expressed by M. Foderé, which has been somewhat hastily adopted by others. In hanging, the mark of the cord is generally oblique, being highest at the back part of the neck in consequence of the loop formed by it, yielding more in that direction than anteriorly. But it is absurd to suppose that this want of obliquity in the impression can afford any evidence in favour of the act having been homicidal. Its form will depend in a great degree upon the fact of the body being supported or not, for it is the weight of the body which causes its obliquity: it will also depend on the manner in which the cord is adjusted. A case of suicidal hanging, is related by Orfila² in which the mark of the cord extended horizontally round the neck from behind forwards. The slip-knot of the cord was in front of the neck, and it is obvious that when the cord is thus adjusted by a suicide, there will be scarcely any obliquity in the depression produced by it. Equally ill-founded is the assertion, that the existence of two impressions on the neck, affords positive proof of homicide. One of these impressions may be at the lower part of the neck, and circular; the other at the upper part, and oblique;—it is therefore

¹ Op. Cit. p. 181.

² Op. Cit. Tome II. p. 376.

contended that the deceased must have been strangled in the first instance and afterwards hanged. The possibility of a prior attempt being made by a suicide to strangle himself is not adverted to,—“si l'on observe les deux impressions,” says Mahon, “l'assassinat est alors parfaitement prouvé.” It is fortunate that there are facts on record to oppose to this very decided statement. One of the first cases reported by Esquirol, is that of a female lunatic who committed suicide by hanging herself, and on whose neck, two distinct impressions were seen,—the one circular, the other oblique. These appear to have arisen from the circumstance of the cord having been twice passed round the neck, and the body being at the same time partially supported. We can therefore only allow that in many cases, a presumption of homicidal interference may exist if there be two distinct impressions, but we cannot admit that they establish the fact of murder.

The injury done to the neck by the cord, can rarely afford any clue to the manner in which hanging took place, unless the circumstances under which the body is found, favour the presumption of homicide or suicide. Thus the laceration of the muscles and vessels of the neck,—the rupture of the trachea and the displacement of the larynx, may be observed in suicidal as in homicidal hanging. The presumption, however, is obviously in favour of the latter when these violent injuries are discovered, accompanied by fracture of the cervical vertebræ, and the body of the deceased is not corpulent, the ligature, by which he is suspended is not of a nature to produce them, and the fall of the body has not been great. A much disputed question has arisen in medical jurisprudence, as to whether the cervical vertebræ can become fractured or displaced in suicidal hanging. Most medico-legal writers deny its possibility,—the displacement or fracture of these vertebræ being rarely observed even in criminal executions, where the greatest violence has often been used by the executioner. So far as my own reading extends, I have never met with the history of a case of *suicide* in which this injury to the neck existed. The case referred to by Petit, which was left to the decision of Dr.

Pfeffer,¹ is unsatisfactory, because the body was not examined, and it was doubtful whether the act had been one of suicide or not. M. Ansiaux, of Liège, in inspecting the body of a woman who had hung herself, found extravasated blood behind the two first cervical vertebræ, which were more widely separated posteriorly, than usual. On carefully removing the vertebræ, the posterior ligament of the spine was ascertained to be ruptured, and the transverse ligament of the atlas was so stretched that the odontoid process of the second vertebra was completely locked against the articular surface. The perpendicular and oblique ligaments were entire. This female was a stout healthy person,—when discovered, her body was suspended from a beam at the distance of about a foot and a half from the floor. She had evidently fallen with considerable weight. The case of this female, will serve to shew that severe injury to these deep seated regions of the neck, may occasionally be met with in suicidal hanging.

In all doubtful cases, we should not lose sight of moral and circumstantial evidence. We should ascertain whether the individual had been previously disposed to commit suicide or not,—we should observe whether the doors and windows of the apartment be secured on the inside or on the outside,—whether the dress of the deceased be at all torn or discomposed, or his hair dishevelled,—lastly, whether the rope or ligature correspond to the impression seen around his neck. These points fall, it is true, more within the province of the officers of justice, than of the practitioner; but the latter is generally the first who is called to see the deceased, and, therefore, unless such facts were noticed by him on his visit, they might often remain altogether unknown.

Lastly, it has been contended that the position of the body may serve to distinguish suicidal from homicidal hanging. This point was strenuously argued on the investigation which took place relative to the death of the late Duke de Bourbon. According to the opinions of some of the witnesses on that

¹ Vide FODERÉ, loc. cit.

investigation, if the body of a man is found in an inclined posture, or so suspended as that his feet are in contact with the floor, the idea of suicide by hanging is at once negatived,—we are rather to suppose that the person must have been otherwise destroyed, and his body afterwards placed in that position by his murderers. Here then we are called upon to admit that suicidal hanging is improbable, if not impossible, unless the deceased be found freely and absolutely suspended without any support. To this opinion, we will now oppose a few facts. Among the cases collected by Esquirol is the following. A patient in La Charité was found one morning hanging by the rope, which was attached to the head of his bed. He had fastened this by a loop round his neck, but his body was so retained that when discovered he was on his knees by the side of his bed. There are one or two other similar instances related by the same author which I shall omit, and describe two that have fallen within my own knowledge. In 1832, at the west end of the town, a man was found hanging in his room with his knees bent forwards and his feet resting upon the floor. He had evidently been dead for some time, since cadaverous rigidity had already commenced. The manner in which this man had committed suicide, was as follows,—he had made a slip-knot with one end of his apron (he was a working mechanic), and having placed his neck in this, he threw the other end of the apron over the top of the door and shutting the door behind him, he had succeeded in wedging it in firmly. At the same moment, he had probably raised himself on tip-toe and then allowed himself to fall,—in this way he died. The weight of his body had apparently sufficed to drag down a part of the apron, for it seemed as if it had been very much stretched.

In October 1833, a gentleman who was employed as an assistant in a respectable school in the neighbourhood of London, was discovered by some of his pupils one morning in a sitting posture on a dark part of the stair-case of the house. Upon examining further, it was ascertained that he was completely dead and that he was suspended by a cravat firmly tied round his neck, to the banisters. The deceased

had evidently made two similar attempts at self-destruction before he succeeded, as part of a silk pocket-handkerchief and his braces, were found suspended to other parts of the banisters. It seemed scarcely possible to those who discovered him, that the deceased could really have accomplished suicide by hanging in such a situation, for his body was resting entirely on the stairs, and making every allowance for the slipping of the ligature by which he was suspended, still his feet must have been throughout in contact with the stair. Further evidence need not be adduced to shew how unfounded is that opinion which would attach the idea of homicidal interference, to cases where a body is loosely suspended or in contact with any support. We ought rather to consider this fact as removing all suspicion of homicide; for there are few murderers who would probably suspend their victims either living or dead without taking care that the suspension was complete. Besides, all such cases are readily explicable;—thus if the ligature be of yielding materials or loosely attached, it will give way to the weight of the body after death, and allow the feet to touch the floor, which they might not have done in the first instance. If there is reason to believe that the body has not altered its position after suspension, we must remember the facility with which insensibility comes on, and the rapidity with which death commonly ensues in this form of asphyxia.

There have been few medico-legal investigations of late years, which have excited greater interest than the case of the Duke de Bourbon in France, with an outline of which we will close the subject of hanging.

On the 27th August, 1830, the duke was found suspended in his bed room, in the Chateau of St. Leu. An inquest was held the same morning on the body, and from the evidence of the witnesses, as well as from the reports of the physicians and surgeons who examined it, a verdict was returned to the effect that the duke had committed suicide in a fit of temporary insanity. This event did not excite much notice until the contents of his will were made public.

The deceased it appears had made his will in favour of the Baroness de Feuchères, a female who had lived with him for

some years, bequeathing to her the whole of his immense estates, and leaving the Duke d'Aumale, the youngest son of the king of the French, residuary legatee. The Princes de Rohan, heirs by collateral descent to the deceased, thus finding themselves deprived of an expected inheritance, attempted to set aside the will, alleging that undue influence had been exercised over him. The cause came on for hearing before the First Chamber of the Civil Tribunal of Paris, in December 1831, and excited considerable attention, not so much in consequence of the dispute concerning the validity of the will, as of the question which was raised during the trial,—whether the Duke had committed suicide, or whether he had been murdered and afterwards suspended in order to defeat the ends of justice.

The facts of the case, as well as I have been enabled to collect them from the *procès verbaux*, were as follows. The deceased had naturally partaken of the alarm which had diffused itself throughout France in consequence of the events of the Revolution of 1830. Some of his most intimate friends declared that for some time previously to his death, his mind had been filled with the most gloomy forebodings, as to what this new order of things would bring about. On the morning of the 27th, his servant went as usual to his bed-room door about eight o'clock, but receiving no answer on knocking, he became alarmed. Madame de Feuchères then accompanied the valet to the door of the room, which was fastened on the inside, and receiving no reply after calling to the Duke in a loud voice, she ordered it to be broken open. On entering the apartment, the body of the deceased was found suspended from the fastening at the top of the window sash, by means of a linen handkerchief, attached to another which completely encircled the neck. The head was inclined a little to the chest,—the tongue protruded from the mouth,—the face was discoloured,—a mucous discharge issued from the mouth and nostrils,—the arms hung down,—the fists were clenched,—the extremities of both feet touched the carpet of the room, the point of suspension being about six feet and a half from the floor,—the heels were elevated and the knees half bent. The deceased was partly undressed, the legs were uncovered and had some marks of injury on

them. Among other points of circumstantial evidence, it was remarked that a chair stood near the window to which the deceased was suspended, and the bed looked as if it had been lain on.

The medical witnesses who examined the body soon after its discovery, stated that they found it cold, and the extremities rigid, from which they inferred that the deceased had been dead eight or ten hours. This would have fixed the time of his death at midnight of August 26th or early on the morning of the 27th. The body underwent a second examination, a report of which was furnished to the legal authorities on the following day. Five medical men were present at the inspection, and they give it as their opinion from the post-mortem appearances, 1st, that the deceased had died by hanging, and 2ndly, from the absence of all marks of violence or resistance about the person or clothes of the deceased, and other facts, that he had destroyed himself. They considered that the contusion on one arm and the excoriations observed on both legs, must have arisen from the rubbing of these parts against the projecting rail of the chair near the window. The mark on the neck of the deceased, they described to be large, oblique, and extending upwards to the mastoid process.

General evidence was given to shew that the Duke had meditated self destruction, and had conversed about it with some of the witnesses. On the morning of the 28th, some fragments of paper which had been written on, were taken from the grate of his chamber: these were carefully put together by one of the legal inspectors, and among a few disjointed sentences indicating despair and a dread of impending danger, were the following. "It is only left for me to die in wishing prosperity to the French people and my country." "Adieu for ever." Here followed his signature, and a request to be interred at Vincennes, near the body of his son, the Duke d'Enghien. It is necessary to observe that no noise or disturbance was heard in the bed-room on the night of the deceased's death.

On the other side, it was contended that the Duke was not unusually melancholy before his death,—that the supposition of suicide was inadmissible in a moral point of view, and indeed was physically impossible from the circumstances.

One person argued that he could not have made the knots seen in the handkerchiefs,—another that he could not have reached so high above his head to have suspended himself, and that the chair could not have been used in any manner to assist him : while a third affirmed that a person might be suspended in the position in which the body was discovered, without death ensuing. The circumstance of the door being fastened on the inside, was accounted for by supposing that the bolt had been pushed to from the outside. The Duke had been heard to condemn suicide, he had made an appointment for the following day and had attended to many little circumstances, such as winding up his watch the night previously, and noting his losses at play,—facts which were forcibly urged as being opposed to the supposition of his having destroyed himself.

To combat the medical evidence, it was assumed that the deceased was strangled or suffocated and was afterwards hanged by assassins. Several schemes were devised by the medical witnesses on this side of the question, to account for the manner in which the supposed murder was committed. According to some, a handkerchief might have been tightened round the deceased's neck by one assassin, while another forcibly held his legs under the bed-clothes, by which the lesions already described, would have been produced ;—or instead of being strangled by a handkerchief, he might have been suffocated by a pillow placed over his mouth. The body might then have been dragged across the room to be suspended, and if during this time, the hand of one of the assassins had been rudely thrust between the cravat and the neck, the excoriation and mark seen on the skin might be easily accounted for.

The counsel for the appellants remarked that the want of a line in writing to withdraw from all suspicion his attendants and even Madame de Feuchères, was remarkable, as *this latter precaution* had suggested itself to *almost every suicide*. He condemned those engaged in the anatomical examination of the body, as having been guilty of culpable mismanagement. He ridiculed the idea that the Duke, as reported by the two physicians consulted, had probably come to his death

through asphyxia by strangulation. He contended that all the appearances on the skin of the neck, where no ecchymosis, *as is usual in persons hung alive*, was visible, *shewed that death had preceded the hanging of the body.*

Such is an outline of this very singular case. Upon considering the facts and not the suppositions, which were adduced during the investigation, we can hardly fail to draw the conclusion that the deceased committed suicide. It clearly appears from the evidence of those who first inspected the body, that death was caused by hanging. It is true that some of the witnesses pronounced this to be *impossible*, because the body was so nearly in contact with the floor, and no ecchymosis was apparent in the impression produced by the ligature, as well as for other circumstantial reasons which need not here be recapitulated; but these witnesses were for the most part ignorant and uninformed persons, whose opinions respecting the possibility of such an occurrence, were not for a moment to be placed in opposition to those of the experienced medical examiners. The chief medical witness for the plaintiffs, urged that death might have been caused by strangulation or suffocation while the Duke was lying in bed; but setting aside the circumstances which refuted this opinion, there were no facts to support it: and on the other hand, there was nothing medically speaking, opposed to the belief that death had ensued from hanging. The dress was not discomposed, there were no marks of violence about the person, and it was not shewn by the medical witnesses on this side of the question, that the excoriations on the legs could not possibly have had *an accidental origin*. Besides they do not appear to have considered that the Duke might have made repeated attempts before he succeeded in suspending himself, and, in these attempts, have received the injuries. The absence of ecchymosis from the course of the ligature, and the position of the body, prove nothing whatever against death by suspension; while all the appearances of the body itself must tend to convince an unprejudiced mind, that this was really the manner in which the deceased died. If we feel fully

satisfied from a consideration of these simple facts, that death was caused by hanging, we shall have less difficulty in admitting that the hanging was suicidal : we may perhaps best establish this by observing into what admissions we shall be led, by adopting a contrary supposition. Hanging, as I have already stated, is a very unusual form of committing murder,—the individual, with the exceptions mentioned, has it in his power to resist this description of violent death more than most other kinds. Now, although the Duke was old and infirm, yet we can scarcely conceive that his infirmities were so great as to have rendered him wholly incapable of resisting the murderous attempts of these assassins ; but on the supposition that this was an act of homicide, we must imagine that he did not offer any resistance,—that he quietly walked across the room to be hanged ; for we cannot but consider it clearly established by the evidence, not only that he died by hanging, but that he died where his body was found. We must further presume that in moving from his bed, he neglected to ring a bell which was near the bed-side, and which would have sufficed to alarm his attendants,—that his assassins, tied the handkerchiefs together by a very curious and intricate knot, which the Duke was incapable of tying, that they then adjusted his bed, and placed a chair by the side of the body and left the room, drawing back the bolt on the outside by a spring with which they had previously provided themselves,—we are called upon to admit that all these proceedings were carried on without any noise or disturbance by which some of the members of the household might have been roused !

The moral evidence was decidedly in favour of the commission of suicide, nor does the admission of the facts that the deceased had some time previously spoken against self-destruction—that he had made his memoranda the night preceding his death—wound up his watch, &c. at all militate against the presumption of self-destruction ; for the histories of suicides abound in incidents of this kind. A man may form the resolution to destroy himself at one moment,—he may abandon it the next ; but again a sudden impulse may subsequently induce him to put his original

intention into execution. The great moral shock which must have been caused to all the members of the Royal Family in France, on the occurrence of the revolution of 1830, was by no means unlikely to prey upon the mind of the Duke and lead to the commission of the crime; but whether this will explain the fact or not, the moral evidence adduced against it, does not affect the question, since we can only imagine the deceased to have been murdered by having recourse to a tissue of improbabilities. An attempt has been made to explain the circumstances of this case, by supposing that the deceased hung himself without intending self-destruction, but merely for the sake of enjoying a certain degree of pleasure which, according to some, is experienced on the access of this species of asphyxia. What the Duke's intentions may have been, it is impossible to say, but the medico-legal questions connected with his death are: First, whether he died by hanging; and Secondly, whether, if so, he hanged himself or was hanged by others. Therefore, they who admit this singular explanation, admit all that is required to be proved.¹

STRANGULATION.

Hanging and Strangulation have been usually treated of together, and some writers have admitted no distinction in the meaning of these terms. In hanging, the phenomena of asphyxia take place in consequence of the suspension of the body, while in strangulation, asphyxia may be induced not only by the constriction produced by a ligature round the neck independently of suspension, but by the simple appli-

¹ The cause was decided against the appellants, and the president observed in summing up, that the charge of murder had been twice proved to be unfounded by judiciary proceedings. The medical jurist must regret that personal and political feelings, were allowed to become so much mixed up with this investigation. Popular prejudice went with the cause of the appellants; for it is notorious that the vulgar are ever ready to believe, on the death of a king, a prince, or a duke, that there must have been some criminal interference. If we admit that the medical facts in this case, justified a charge of murder, it is certain that nine cases out of ten of suicidal hanging, might be successfully disputed.

cation of pressure through the fingers or otherwise to the trachea. It may indeed be said, that every individual who is hanged is literally strangled; but hanging is only one form of strangulation and sufficiently peculiar to claim a separate consideration. We have now, therefore, to direct our attention to the other means which have been employed to obstruct the respiratory process by external pressure on the trachea. These have commonly been arranged and treated of under the head of manual strangulation.

The cause of death is the same in the two cases, and the rapidity with which death ensues in strangulation will depend in a great degree on the force employed, and on the completeness with which the respiratory process is obstructed. In strangling, a much greater degree of violence is commonly employed than is necessary to produce asphyxia; and, hence, the marks produced on the skin of the neck, will be, generally speaking, much more evident than in hanging, where the mere weight of the body is the medium by which the trachea is compressed.

The post-mortem appearances externally and internally are the same in strangulation as in hanging, but the injury done to the parts about the neck, is commonly greater in the former case than in the latter. If much force have been employed in producing the constriction, the trachea with the muscles and vessels in the fore part of the neck, may be found cut or lacerated and the cervical vertebræ may be fractured. The mark of the ligature, if a ligature has been used, is generally circular and situated at the lower part of the neck. Instances have, however, been related where a circular mark has been observed in hanging, and it is possible that some degree of obliquity may occasionally exist in the course of the depression produced by a ligature in strangulation. The medical jurist ought, therefore, to weigh all the circumstances connected with the position of the body and the direction of the ligature, before he forms an opinion as to whether the individual has been hanged or strangled. Much more importance is to be attached to the lividity, ecchymosis and abrasion of the skin in the course of the ligature, than to the circularity or obliquity of the

depression produced by it. In the strangling of a living person by a cord, it is scarcely possible that a murderer should avoid producing on the neck, the marks of violent injury, and in the existence of these, then, we have an evidence of the manner in which death has taken place, which we cannot always expect to find in hanging. On the other hand, a person may be strangled, and yet the ligature, in consequence of its being soft and of a yielding nature, will not cause a very perceptible depression or ecchymosis. Such instances must of course be rare, because murderers usually produce a much more violent constriction of the neck, than is necessary to ensure the death of their victims.

The medico-legal questions relative to strangulation, are of the same nature as those which have already been discussed in treating of hanging. Thus in examining the body of a person, suspected to have been strangled, we may be asked to state:—

Whether death was caused by strangulation, or whether the constricting force had not been applied to the neck after death ?

The internal appearances of the body, will yield no evidence by which such a question can be solved ; but the external appearances, as I have just remarked, are commonly less ambiguous, than in a corresponding case of hanging. The ecchymosis about the depression on the neck, when a ligature has been employed, with the accompanying turgescence and lividity of the face, are phenomena not likely to be simulated in a dead body by the application of any degree of violence. It is possible that, when the constriction is produced within a few minutes after dissolution, an ecchymosed depression may result ; but it is improbable that there should be any lividity or turgescence of the countenance. It is difficult to conceive under what circumstances such an attempt to simulate strangulation in a recently dead body, could be made, unless for the purpose of throwing suspicion upon an innocent person connected with the deceased. When an individual has been murdered, it is not likely that the murderer would attempt to produce the appearances of strangulation on the body after death, under the idea of concealing his crime ; for

strangulation is in most cases a positive result of homicide, and is very rarely seen as an act of suicide. In the absence of ecchymosis from the neck, it will be difficult to form an opinion unless from circumstantial evidence. It must be remembered, however, that there may not always be an ecchymosed circle, for an individual may be strangled by the application of pressure to the trachea through the medium of the fingers or of any hard or resisting material.

In most of the cases in which a witness may be required to give an opinion as to whether the deceased has been strangled or not, it is very possible that the murderers, supposing the murder to have been accomplished by strangulation, will attempt to conceal their crime by placing the body in a situation to avert suspicion. The following cases will shew that the circumstances under which a body is found, will not deceive those who exercise only a common degree of caution in these investigations.

During the political disturbances of the year 1677, the body of Sir Edmondbury Godfrey, an eminent magistrate, was discovered in the neighbourhood of Islington, lying in a ditch. His sword was found to have been passed completely through the thorax, traversing the heart, but there was no appearance of hæmorrhage about the spot. It was evident that so extensive an injury could not have been inflicted during life, without a considerable loss of blood taking place; and, hence, a suspicion arose that the deceased had been murdered and his body placed in the spot where it was discovered, by his murderers. On examining the face it was found to be livid and suffused,—the eyes were blood-shot,—and there was an ecchymosed mark, an inch in breadth, extending around the neck. There was also fracture of the cervical vertebræ, so that the neck might be freely moved in all directions. These appearances rendered it certain, in the minds of the medical witnesses, that the deceased had died by strangulation, and, that his sword had been passed through the chest after death to remove the suspicion of homicide. The murderers were subsequently tried and executed.¹

¹ State Trials.

In the year 1688, a man of the name of Standsfield, was tried for the murder of his father, Sir James Standsfield, at New Milns, in Scotland.

The prisoner and the deceased had lived for some time on very bad terms, when, about the period of the alleged murder, the body of the deceased was discovered floating in a neighbouring stream. The prisoner caused the body to be immediately interred, but it was afterwards exhumed and submitted to medical examination. The face was found to be livid and swollen, and a dark livid discolouration of considerable width, extended round the neck involving the larynx:—on cutting into this, dark coloured blood was found to be extravasated within the cellular membrane. There were also other marks of violence on the chest and face. Internally there were no appearances met with, which indicated the probability of death by drowning,—on the presumption of which, the prisoner chiefly rested his defence. The medical witnesses gave it as their unanimous opinion that the deceased had been strangled, and his body had been afterwards thrown into the water. Circumstances clearly established the criminality of the prisoner, and he was condemned and executed.

In the absence of all marks of violence about the neck, we should be cautious in giving an opinion which may affect the life of an accused party; for it is scarcely possible that homicidal strangulation could be accomplished without the production of some appearances of violence about the larynx or trachea. The medical witness should be prepared to consider whether in such a case, death might not have proceeded from some other cause, and leave it to the authorities of the law, to decide from circumstances in favour of, or against the prisoner. There is, I conceive, nothing to justify a medical witness in stating that death has proceeded from strangulation, if there should be no appearance of lividity, ecchymosis, or other violence about the neck or face of the deceased. The state of the countenance alone, will scarcely warrant the expression of an opinion; for there are many kinds of death in which the features may become livid and distorted from causes totally unconnected with the

application of external violence to the throat. Let not the witness, then, lend himself as an instrument in the hands of a counsel for the condemnation of a person against whom nothing but a strong suspicion from circumstances may be raised, and where medical evidence is unable to throw any light upon the probability of death having resulted from strangulation. A cautious medical opinion in the case of Thomas Harris, would have sufficed to have saved that unfortunate person from the scaffold. This man was an innkeeper, and, in the year 1642, was tried for the murder of a pedlar, who, having arrived at the inn the evening before, was found dead in his bed the following morning. The principal witness against the prisoner, was one of his own servants, who swore that he saw his master on the stranger's bed in the act of strangling him. On examination, no mark of violence was discovered on the person of the deceased; but the prisoner was found guilty of the crime on what then appeared to be the clearest circumstantial evidence. He was executed, and in the following year his innocence of the crime imputed to him, was fully proved by the confessions of the principal witnesses on the trial. The deceased had died of apoplexy in the night!¹

If death has really taken place from strangulation, the medical jurist may next have to consider:

Whether the strangulation was the result of accident, of suicide, or homicide?

We must first establish the possibility of strangulation resulting from accidental causes. The following case is related by Smith, as an illustration of this kind of death. A young man of a particular turn for mechanical and other inventions, having lost in a great degree the use of his upper extremities, was accustomed to assist himself in moving a heavy weight by means of a cord attached to it and passed round his neck. One morning, shortly after having retired from the family to his own room, his sister discovered him sitting in a chair apparently lifeless. He was found to be

¹ Theory of Presumptive Proof.—Vide also STARKIE'S Law of Evidence, Vol. I.

quite dead, and the cord, by which he moved the weight, was twisted round his neck. On cutting the cord, the weight which was appended to it, fell on the floor. There was but little doubt from the appearance of the furniture around the body, that the deceased had attempted to move the weight in the usual way, but that, in this attempt, the weight had slipped behind and had caused a compression of the tracheæ sufficient to produce strangulation.

In all cases of accidental strangulation, the position in which the body is found, as well as other points of circumstantial evidence, must suffice to establish unequivocally the manner in which death really took place. Where a charge of murder is instituted against a party, an attempt is not unfrequently made by the counsel for the defence, to shew the probability that the deceased might have fallen in a state of intoxication; and have become accidentally strangled by a tight cravat or by any foreign body exerting pressure on the trachea. In the case of Carwardine, which has been already related, the counsel for the prisoners, endeavoured to draw from the medical witnesses an admission that the deceased might have perished accidentally in the manner described. If we admit the possibility of an occurrence of this nature, we must not lose sight of the existence of other more probable modes of death, nor should we allow our judgment to be swayed so as to abandon what is probable for that which is merely possible.

In the following case, the chief question for the jury to consider, was whether the deceased had been accidentally strangled or not.

In the year 1763, a man of the name of Beddingfield was found dead in his bed-room. His body was lying on the floor at the foot of the bed, with the face downwards. One hand was in close contact with his throat, while the other was under the body. There were marks of fingers and of scratches produced by finger-nails at the side of the throat and in front of the wind-pipe. According to one witness, there were the impressions produced by a thumb and three fingers, while according to another there were the marks of a thumb and four fingers. The face of the deceased was

livid and swollen. The medical opinion was, that the deceased had died by strangulation. It was now attempted to be shewn that the deceased might have fallen out of bed, and his hand being found in the position indicated, the marks on the neck might have been thus produced while the deceased had become accidentally strangled. The medical evidence was somewhat unsatisfactory, but the circumstances were so clear against the parties who were tried for the murder, that the jury did not hesitate to find them guilty, and they were subsequently executed. Previously to execution, one of them confessed that he had strangled the deceased by applying violent pressure to the fore part of his throat.

Suicide by strangulation must be regarded as of extremely rare occurrence, and except under particular circumstances, impossible. The possibility of an individual strangling himself, was for a long time denied by medical jurists;—for it was presumed that where the force was applied by the hand, all power would be lost so soon as the compression of the trachea commenced. This reasoning, which is physiologically correct, is, however, only applicable to those cases in which the trachea is compressed by the fingers or by means of a ligature simply tightened by the hands. Where an individual, determined on suicide, allows the trachea to become compressed by leaning with the whole weight of his body on a ligature passed round his neck and attached to a fixed point, he may perish in this way almost as readily, as if he had hanged himself: for insensibility will soon supervene, and the accession of this state speedily determines a fatal result. In the section on hanging, it was stated that suicides were often found with their bodies in close contact with the ground, and there are cases on record in which strangulation has been accomplished in the manner above-described while the suicide was in a sitting posture. On other occasions, the peculiar disposition of the ligature, has enabled a suicide to strangle himself without much difficulty. An instance is related by Orfila, where two cravats, which were twisted several times round the neck of the deceased, who was discovered lying on his bed, had effectually served

the purpose of self-destruction.¹ A case is related by Beck where the suicide succeeded in strangling himself by tightening the ligature with a stick. The ligature was found to have been thereby twisted several times, and it was prevented from again becoming uncoiled by the circumstance of the stick having become firmly secured behind the ear. In all cases of suicidal strangulation a suspicion of murder might arise, and, therefore, something more than the bare admission of the possibility of its having been the act of the deceased, will be required to establish the innocence of an accused party. The previous history of the deceased, and the precise circumstances under which the body is discovered, will materially assist in elucidating the question. There are but few cases, in which suicidal strangulation can be admitted to take place; and it would require a great deal of art and contrivance on the part of the murderer, so to dispose the body of his victim, or to place it in such a relation to surrounding objects, as to render the suspicion of suicide probable. Thus if the ligature should be found loose or detached,—if the ecchymosis should not accurately correspond to the points of greatest pressure,—if, moreover, the means of compression were not very evident when the body was first discovered, and before it had been removed from its situation, there would be very fair grounds for presuming that the act was homicidal. In all those cases, where the strangulation has resulted from compression of the trachea by the fingers, and where there are fixed ecchymosed marks, indicative of direct manual violence, we have the strongest presumptive evidence of murder; for neither accident nor suicide could be urged as affording a satisfactory explanation of their presence.

Strangulation does not often come before our courts of Law as a question of murder; and when a party has been tried upon a charge of this kind, the circumstances have been commonly so clear, as to have rendered the duty of the medical witness one of a very simple nature. A trial for murder by strangulation, took place at the Chester Assizes in April, 1835. The manner in which the murder was committed was

¹ Op. Cit. Vol. III. p. 389.

as follows. The prisoner who was a robust man, upon some slight provocation, seized the deceased by the cravat and pressed him firmly by the neck against a wall, until he was dead. On examination of the body, the face was found to be livid and swollen and the features distorted. There was also a considerable discolouration and depression on that part of the neck to which the pressure had been applied. The prisoner was seen to commit the crime by several witnesses. The case was clearly proved against him, but he was acquitted on the ground of insanity.

In some instances, an artful murderer may attempt to destroy life by strangulation without leaving any of the common traces of violence on the neck. Thus a hard substance may be used to produce compression of the trachea, but in consequence of its being enclosed within a ligature made of soft materials, the mark produced by it may be less evident owing to its becoming more diffused. The case of Dr. Clench will serve to shew the singular means which are sometimes resorted to for the purpose of effecting strangulation. This physician, who was at the time practising in London, was called up by two persons on the night of the 4th January 1692, under the pretence of accompanying them to a friend who was not well. After having driven about for some time, the coachman was sent on an errand by these men,—when he returned, he found that they had gone away, and that Dr. Clench was lifeless, in a sitting posture with his head resting against the cushion of the coach. It was discovered on closer examination, that the deceased had been strangled by a handkerchief in which a coal had been placed, the coal having been applied directly over the wind-pipe.

SUFFOCATION.

When the respiratory process is impeded by any cause which operates independently of external pressure on the trachea, the individual is said to perish by suffocation. The

circumstances under which suffocation may be induced are very numerous. Thus a diseased state of the parts about the passage of the fauces,—the sudden bursting of a tonsillary abscess,—the effusion of lymph into the trachea or about the rima glottidis,—the presence of foreign bodies accidentally or forcibly introduced into the mouth,—may become so many causes of the sudden arrest of the respiratory function, the precise nature of any of which, a very superficial examination of the body will suffice to determine. In a medico-legal point of view, asphyxia induced by the operation of any of these causes, is of far less importance, than that which is a consequence of the respiration of certain gases unfitted for the support of life: it is, therefore, chiefly to the effect produced on the system by these agents that we will direct our attention in treating of death by suffocation. The numerous gases with which chemists are acquainted, are found to vary materially in their operation when introduced into the lungs; and a division has been established among them into those which have a negative, and into those which have a positive action. The former alone can be considered to cause death by asphyxia or suffocation; for those which have a positive influence, must be regarded as poisons. Now experiment has shewn that there are but two gases, which are essentially negative in their operation,—these are Hydrogen and Nitrogen; all the others have a poisonous action when introduced into the body. Indeed, with regard to hydrogen some doubt may be fairly entertained respecting its claim to be considered as a truly negative agent; for the researches of Allen and Pepys in this country, and the observations of Wetterstedt in Sweden, have shewn that this gas cannot be substituted for nitrogen in atmospheric air without inducing somnolency and lethargy.¹ If, then, we admit that the greater number of the gases are poisonous, it is scarcely correct to regard these bodies as purely asphyxiating agents. The state of lifelessness which follows their introduction into the lungs, is not to be ascribed to the simple negation of air, as in the case of drowning, hanging, or strangulation; but to a

¹ BERZELIUS. *Traité de Chimie*, Vol. VII. p. 106.

deleterious impression produced on the system, something analogous in its effects to that which is observed to follow the ingestion of a poisonous dose of hydrocyanic or oxalic acid. Nevertheless, as the medico-legal history of the poisonous gases, has nothing in common with that of poisons in general, they may be appropriately treated of in the present chapter as suffocating media, according to the common acceptation of their action on the body.

The greater number of these gases, are never likely to be met with in the atmosphere so abundantly as to produce injurious consequences. They are chiefly the complex products of art, and hence fatal accidents, arising from their inhalation, most commonly occur under circumstances which can leave no question respecting the real cause of death. The peculiar effects of all of these, it will be unnecessary to describe; but there are two, a knowledge of the properties and operation of which, may on certain occasions be required of the medical jurist,—these are the Carbonic Acid and Sulphuretted Hydrogen Gases. Agents of this description, can scarcely be employed as instruments of murder; and if they were so employed the fact could only be established by circumstantial evidence. Death when arising from the respiration of either of these bodies, is generally attributable to suicide or accident. In France, it is by no means uncommon for individuals to commit self-destruction by sleeping in a closed apartment in which charcoal has been suffered to burn; while in England, accidental deaths are sometimes heard of where coal has been employed as fuel in a small and ill-ventilated room. On such occasions, a person may be found dead without any apparent cause to the casual observer,—the face may appear tumid and discoloured, and the cutaneous surface may be covered with ecchymosed patches. The discovery of a body under these circumstances, will commonly be sufficient in the eyes of the vulgar, to create a suspicion of murder; and some unfortunate individual, with whom the deceased may have been at that period on bad terms, will perhaps be pointed out as the murderer. In such a case, it is obvious that the establishment of the innocence of the

accused party, will depend entirely on the discrimination and judgment of the medical practitioner.

An instance, illustrative of the consequences of this popular prejudice, occurred in London in the year 1823. Six persons were lodging in the same apartment where they were all in the habit of sleeping. One morning an alarm was given by one of them, a female, who stated that on rising she found her companions dead. Four were discovered to be really dead, but the fifth, a married man whose wife was one of the victims, was recovering. He was known to have been on intimate terms with the female who gave the alarm, and it was immediately supposed that they had conspired together to poison the whole party in order to get rid of the wife. The woman who was accused of the crime was imprisoned, and an account of the supposed murder was soon printed and circulated in the metropolis. Many articles of food about the house, were analysed in order to discover whether they contained poison, when the whole of the circumstances were explained by the man stating that he had placed a pan of burning coals between the two beds before going to sleep, and that the doors and windows of the apartment were closed.¹

I. *Carbonic Acid*. This gas is freely liberated in respiration, combustion, and fermentation,—it is also extricated in the calcination of chalk or limestone, and is abundantly diffused through the shafts and galleries of coal mines, where it is commonly called *Choke-damp*. The carbonic acid gas is likewise met with in wells, cellars and other excavations in the earth. In these cases, it generally collects on the soil or at the lower part of the well, from its extreme density, and it appears to proceed from the decomposition of animal and vegetable matters, confined in such situations.

The symptoms of poisoning by this gas, will vary according to the degree of concentration in which it is present in the atmosphere when respired. Where it exists in a fatal proportion, the symptoms commonly observed are as follows :

¹ CHRISTISON on Poisons, p. 583.

—A sensation of great weight in the head;—giddiness;—a sense of constriction in the temporal regions;—a ringing in the ears with a pungent sensation in the nose;—a strong tendency to sleep accompanied by vertigo, and so great a loss of muscular power, that if the individual be at the time in an erect posture, he instantly falls as if struck to the ground. The respiration, which is observed to be at first difficult and stertorous, becomes suspended. The action of the heart, which on the first accession of the symptoms is very violent, soon ceases. Sensibility is lost, and the person now falls into a state of profound coma, or apparent death. The warmth of the body still continues; the limbs remain flexible, but sometimes they have been observed to become rigid or even occasionally convulsed. The countenance is commonly of a livid or of a deep leaden colour, especially the eye-lids and lips, but on some occasions, it is stated to have been pale. The access of these symptoms has been sometimes accompanied by a pleasing sensation of delirium, while at others the most acute pains have been suffered. In a few cases there appears to have existed some irritability of the stomach, for the affected person has rejected the contents of his stomach in a semi-digested state. They who have been resuscitated, have often felt pain in the head, or pain and soreness over the body for several days; while, in a few severe cases, paralysis of the muscles of the face has supervened on recovery.

Externally, the whole of the body appears as if it were swollen, especially the face, which is generally livid, and the features are much distorted. The cutaneous surface is covered in parts by patches of a violet hue; the eyes are generally prominent, and, in many cases, retain their usual brilliancy for some time after death. It is worthy of remark, that the body of an individual who has perished from the inhalation of carbonic acid retains the animal heat, *cæteris paribus*, for a longer period than usual; and hence cadaverous rigidity does not commonly manifest itself until after the lapse of many hours.

On making a post-mortem inspection of the body, the

venous system is found filled with blood of a dark colour, and the vessels of the lungs and the brain are observed to be especially in a state of congestion. The tongue appears swollen, and it is stated by Orfila, that the mucous membrane of the intestinal canal is often interspersed with dark ecchymosed patches.¹

Some difference of opinion still exists respecting the manner in which carbonic acid acts on the body. Nysten ascribed to it a negative influence; he believed that it had no positively deleterious properties, because he found that it might be injected into the circulation without producing any unpleasant effects upon the animal, provided due caution was employed in the injection. The result of these experiments of Nysten's, however, can scarcely be regarded as conclusive, or as satisfactorily applicable to the human species; for the introduction of a few cubic inches of gas into the blood contained in a vessel, cannot be expected to produce on the system effects similar in intensity to those which ensue, when many cubic inches of it come in contact at once with a large quantity of blood diffused over an extensive surface, as in the lungs. Sir Humphrey Davy ascertained that carbonic acid, in a perfectly pure state, did not pass into the trachea, when an attempt was made to respire it; the glottis seemed to close spasmodically at the moment that the gas came in contact with it. On diluting the carbonic acid with about twice its volume of air, he found that he could breath it, but it soon produced symptoms of vertigo and somnolency. In fact, in a diluted state, it is certain that it must penetrate into the lungs, or otherwise it would be impossible to explain why it should produce any other symptoms on the economy than those witnessed in the inhalation of hydrogen or nitrogen. The facts which have been collected by Dr. Christison shew, in a most striking point of view, that carbonic acid is a real and energetic poison. If, as Nysten supposed, it had a negative effect when respired, it ought to follow, that it might be substituted for nitrogen, in the proportion in which that gas exists

¹ Médecine Légale, Vol. III. p. 376.

in atmospheric air. But a mixture of carbonic acid and oxygen, in atmospheric proportions, has been shewn by M. Collard de Martigny, to produce rapidly fatal effects upon the animal system. Such a mixture cannot be breathed even for a period of two minutes, without giving rise to serious symptoms.

When the gas enters into the pulmonary cells, it is probably absorbed by the blood, and circulated with that fluid throughout the body. Its specific action on the brain is inferred from the headache, vertigo, somnolency, and coma which follow its introduction, as also from the loss of muscular power in persons labouring under its effects, and the paralysis which is sometimes seen in those who have recovered. A very small proportion of carbonic acid, when respired for a certain time in combination with air, will suffice to destroy life in man or in any of the higher orders of animals. It is generally admitted by physiologists, that an atmosphere containing more than one-tenth of its volume of carbonic acid will, if introduced into the lungs, speedily prove fatal to human life.¹ Where the gas is respired in the lowest poisonous proportion, the symptoms come on more slowly, and the transition from life to death is frequently tranquil: this is what we learn from the histories of suicides. The symptoms in such cases appear to resemble closely those which indicate the progressive influence of opium, or any other narcotic poison on the body.

The gas extricated during the combustion of charcoal, according to the experiments of Orfila, is not pure carbonic acid, but a very compound mixture.² It operates fatally when respired, chiefly in consequence of the carbonic acid contained in it; the proportion of which, however, is subject to variation, according to whether the combustion be vivid or not. When the charcoal burns vividly, the quantity of carbonic acid is less than when the charcoal is either nearly extinguished or beginning to burn. In the former case, the carbonic acid is in the proportion of about

¹ BERZELIUS, *Op. Cit.* Vol. VII. p. 107.

² ORFILA, *Méd. Lég.* Vol. III. p. 374.

eleven per cent. by volume,—in the latter, the proportion amounts to about fourteen per cent. ; the remainder of the mixture is made up of air, of free nitrogen, and of a portion of carburetted hydrogen, if the charcoal be not too intensely ignited. The gases extricated in the smothered combustion of coal are of a very compound nature. In addition to carbonic acid, we may expect to find in the atmosphere of a close room, in which such a combustion has been going on, sulphurous acid gas, and the sulphuretted and carburetted hydrogen gases. These emanations are equally fatal to life, but in consequence of their very irritating nature, they are less liable to give rise to fatal accidents. The sulphurous acid gas, when existing in a very small proportion in the air, has the power of irritating the glottis so violently that, if accidentally respired, it would commonly compel the individual to leave the spot before the vapours had become sufficiently concentrated to destroy life. Nevertheless, accidents from the combustion of coal sometimes occur.

The following cases will convey to the practitioner a knowledge of the symptoms and post-mortem appearances which are commonly met with on these occasions. A few years since, four individuals, in a state of asphyxia, were brought to Guy's Hospital. It appeared that on the evening before, they had shut themselves up in the fore-castle of a coal-brig, and, contrary to the usual regulations, had made a fire. About six or seven o'clock the same evening, some of the crew accidentally placed a covering over the flue, and thus stopped the escape of the smoke from the fire, which was made of a kind of coal containing much sulphur. Early in the morning one of the crew, on opening the hatches, observed three of the inmates lying on the floor, senseless, and frothing at the mouth; the fourth in his crib, in a similar condition. The air in the place was most offensive. After the unfortunate persons were brought on deck, one of them, æt. 21, shewed symptoms of recovery, and when brought to the hospital, seemed only giddy, as if intoxicated. He shortly completely recovered. Another, æt. 40, after breathing oxygen gas, and having brandy and ammonia exhibited, scarcely showed any symptom towards restora-

tion, and died in a few hours. A third, æt. 17, soon began to rally, and, after a few hours, was perfectly enabled to answer any questions: he declared that he felt no pain, sense of oppression or weight, either in his head or chest. The fourth, æt. 15, died the following day, having exhibited no symptom of rallying. Stimulants were administered internally, and warm fomentations were used, but all efforts to produce reaction failed.

The appearance of the individuals, when brought in, was as follows:—lips purple, countenance livid, surface of the body cold, hands and nails purple, respiration very quick and short; pulse small, quick, and feeble; pupils fixed, and total insensibility.

The man, æt. 40, was inspected about four hours after death. The membranes of the brain were congested, and there was a large quantity of fluid under the tunica arachnoides. The sinuses were gorged with blood. The lungs were in a state of great congestion, as also the right cavities of the heart. It was remarked, that this corpse was similar in appearance to that of an executed culprit. The lad, æt. 15, was inspected about thirty-three hours after death. Under the pia mater was observed one small ecchymosed spot; in the substance of the brain there were more bloody points than usual; a small quantity of fluid was found under the tunica arachnoides, and the sinuses were full of coagulated blood. The lungs shewed no congestion, but the right cavities of the heart were much distended with blood.¹

In the burning of lime, carbonic acid is given out very abundantly, and in a very pure form. It has been owing to the respiration of the gas thus extricated, that persons who have incautiously slept in the neighbourhood of a burning lime-kiln during a severe winter, have been destroyed. The discovery of a dead body in such a situation, would commonly suffice to demonstrate the real cause of death; but

¹ This account is extracted from the report given in one of our medical periodicals; but I happened to be present when the four persons were brought to the hospital, and can therefore speak to the accuracy of the details.

the practitioner ought not to be the less prepared to shew that there existed no other apparent cause of death about the person. It is obvious that an individual might be murdered and his body be subsequently placed near the kiln by the murderer, in order to avert suspicion. If there be no external marks of violence, the stomach should be carefully examined for poison; in the absence of all external and internal lesions, medical evidence will avail but little; for a person might be criminally suffocated, and his body, if found under the circumstances above stated, would present no appearances upon which a medical opinion could be securely based. A melancholy accident is related by Foderé to have occurred at Marseillès in 1806, where seven persons of a family were destroyed in consequence of their having slept on the ground-floor of a house, in the court-yard of which, a quantity of limestone was being burnt into lime. They had evidently become alarmed, and had attempted to escape, for their bodies were found lying in various positions. The court-yard was enclosed, and the carbonic acid from its density, had poured into the apartment through the imperfectly closed window and door.

An animal confined within a certain quantity of air, which it is compelled to respire, will soon fall into a state of lifelessness. A human being in the same way, may be suffocated if confined in a close apartment where the air is not subject to change or renewal, and this effect is hastened when a number of persons are crowded together in a small space. The change which air, thus contaminated by respiration, undergoes, may be very simply stated. The quantity of nitrogen in a hundred parts will remain nearly the same, the quantity of oxygen will probably vary from eight to twelve per cent., while the remainder will be made up chiefly of carbonic acid. Such air will also have a high temperature if many persons are crowded together, and will be saturated with aqueous vapour poured out by the pulmonary and cutaneous exhalants. From this statement, it is evident that air which has been contaminated by continued respiration, will operate fatally on the human system, partly in

consequence of its being deficient in oxygen, and partly from the deleterious effects of the carbonic acid contained in it. The proportion in which carbonic acid exists in respired air must be subject to great variation : according to the experiments of Allen and Pepys, it never exceeds ten per cent. by volume of the mixture, how frequently soever it may have been received into and expelled from the lungs. It is certain that insensibility and death would ensue in a human adult, before the whole of the oxygen of the confined air had disappeared ; but the opportunity can rarely present itself of analysing such a contaminated mixture, and therefore, it is impossible to specify the exact proportion in which carbonic acid would exist when the air had proved fatal to the human beings who had respired it. A most dreadful instance of the fatal influence of a confined atmosphere on the human subject, is presented to us in the memorial of Mr. Holwell, respecting the Black Hole of Calcutta. In June, 1756, Shujah Dowlah, viceroy of Bengal, laid siege to the garrison of Fort William, and finally compelled it to surrender. The whole of the prisoners, to the number of one hundred and forty-six, were forcibly thrust by the orders of their barbarous conqueror, into a prison only eighteen feet square, and having at one end two small windows, secured by iron grates, which scarcely allowed a renewal of the air. After a night of horrible suffering, the door was opened, and it was found that there were only twenty-three who gave any signs of life. According to the account of Holwell, the heat became at first very oppressive, so as to give rise to the most profuse perspiration ; to this succeeded a thirst so intolerable, that they sucked their own linen in order to extract from it the smallest quantity of moisture. Many were suffocated by their companions falling on them, while others became delirious and died from extreme exhaustion. It is probable, as Dr. Paris observes, that more lives would have been saved, had the prisoners remained quiet, instead of making violent but fruitless attempts to escape from their dungeon. The experiments of Lavoisier, shew that the consumption of oxygen always becomes greater under violent muscular exertion,

and the efforts which these wretched beings made in the first hour of their imprisonment, doubtless contributed to render the air speedily impure and unfit for respiration.

It is unnecessary to pursue the narrative of Holwell further, it presents an awful picture of the effects of confined air on the system.

Sometimes the medical jurist may be required to state, for the purposes of justice, the nature of the gaseous mixture in which a person may have died. He will have but little difficulty in determining whether carbonic acid is the deleterious agent in such a mixture. When it exists in any quantity in a confined atmosphere, its presence may be identified, if previously collected in a proper vessel, by the following characters. 1. It extinguishes a taper, and from the extreme density of the gas, the smoke of the extinguished taper may be commonly seen to float on its surface. 2. Lime water is instantly precipitated white when poured into a jar of the gas, and the precipitate thus formed, may be collected by filtration, and proved to possess the well known properties of carbonate of lime. The proportion in which carbonic acid exists in the mixture, may be determined by introducing into a given quantity placed over mercury, a strong solution of caustic potash. Absorption will take place after a certain time, and the degree of absorption will indicate the proportion of carbonic acid present.¹

In concluding this account of carbonic acid, there is one other circumstance which deserves to claim our attention. It is a matter of very popular belief, and in fact, it is generally asserted by writers on asphyxia, that the burning of a candle in a suspected mixture of carbonic acid and air, is a satisfactory proof that it may be respired with safety.

¹ Where this destructive agent exists in a confined spot, as in a well or cellar, it may be generally got rid of by placing within the stratum a pan containing the hydrate of lime, loosely mixed into a paste with water. Lives are often successively lost on these occasions, one individual descending after another, in the foolish expectation of at least being able to attach a rope to the body of his companion. The moment that the mouth falls within the level of the stratum, all power is lost and the person commonly sinks lifeless.

Recent observations have, however, tended to shew that this fact is not to be relied on as an indication of security. A case is given in Dr. Christison's work on Poisons, extracted from a foreign periodical, where a servant on entering a cellar in which grape juice was fermenting, was suddenly seized with giddiness. She dropped her candle on the floor, but had time to leave the cellar and shut the door behind her, when she fell down senseless. Those who went to her assistance, found on opening the door, that the candle was still burning. Another case is referred to in the same work, where in an attempt at suicide, on entering the apartment, the person was discovered to be in a state of deep coma, while the choffer of charcoal was still burning. In order to ascertain how far reliance was to be placed upon this popular sign of the salubrity of the air, I undertook the following experiments: I. Twenty-two cubic inches of carbonic acid were mixed with one hundred and ninety-eight cubic inches of air. The mixture was allowed to stand four days, in a mean temperature, and was occasionally agitated in order to promote the equable diffusion of the gas. On introducing a lighted taper into this mixture, it continued to burn without any perceptible diminution in the brilliancy of its flame. II. Twenty c. i. of carbonic acid were mixed with one hundred and forty of air. After allowing the mixture to remain four days, a taper was introduced into the jar, and it burnt with very slight diminution in the intensity of its flame. III. Twenty c. i. of carbonic acid were mixed with sixty c. i. of air. The taper was introduced into this mixture on the fifth day, and it was found that it continued to burn until it reached the bottom of the jar, which was about fifteen inches in depth. Here the flame was perceptibly less brilliant, and after a few seconds, it became extinguished.

These experiments, then, shew that a candle will burn in air which is combined with ten per cent., twelve and a half per cent, or even with so much as twenty-five per cent. of its volume of carbonic acid gas: and, although such mixtures might not prove immediately fatal to man, yet they might give rise to giddiness, vertigo, insensibility, and ulti-

mately death, in those who, after having been once immersed in them, did not hasten to quit the spot.

One point may seem to require explanation, relative to the results of these experiments. The air which is contaminated by frequent respiration, was stated, resting on the observations of Allen and Pepys, never to contain more than ten per cent. by volume of carbonic acid; but it is well known that such air will not support the combustion of a taper, a fact which may seem opposed to the results of the three experiments above mentioned. In respired air, however, there is a deficiency of oxygen, and a proportional excess of nitrogen. The quantity of oxygen is, therefore, not sufficient to maintain the combustion of the taper, hence it becomes extinguished; but that oxygen is still present may be proved by plunging into the mixture ignited phosphorus, which will burn in air in which a taper is extinguished, and produce the well known pyrophosphoric acid vapours. The asphyxiating atmosphere of a confined apartment, in which charcoal or coal has been burnt, may not contain so much as fifteen per cent. of carbonic acid, and yet a taper will not burn in it. The explanation above given is also here applicable, for in such an atmosphere there is necessarily a deficiency of oxygen and an excess of nitrogen.

II. *Sulphuretted Hydrogen.* This gas, in a medico-legal point of view, may be considered next in importance to carbonic acid. Individuals are occasionally accidentally killed by it; but the very offensive odour which a small portion of it communicates to a large quantity of air, is sufficient to announce its presence and to prevent any dangerous consequences from taking place. The sulphuretted hydrogen gas when respired in its pure state, is almost instantaneously mortal. It exerts equally deleterious effects upon all orders of animals and upon all the textures of the body. When injected into the blood-vessels or into the serous cavities, its fatal operation is retarded; but it is found to destroy life, even where it is allowed to remain in contact with the skin. Mr. Donovan states that a rabbit, enclosed in a

bladder of sulphuretted hydrogen gas, but allowed to breathe freely in the atmosphere, perished in ten minutes.¹ When introduced into the lungs of animals, even in a very diluted state, it has been known to give rise to fatal consequences. Thus Thénard found that air which contained only one eight-hundredth of its volume of this gas, would destroy a dog, and that when the gas existed in the proportion of one two-hundred-and-fiftieth, it sufficed to destroy a horse.²

The symptoms produced by sulphuretted hydrogen on the human system, vary according to the degree of concentration in which it is respired. When breathed in a moderately diluted state, the person speedily falls inanimate. The immediate removal to a pure air and the application of stimulants may, however, suffice to restore life. According to the statements made by those who have recovered, this state of inanimation is preceded by giddiness, nausea, sudden weakness and loss of motion and sensation. If the gas in a still less concentrated state, is respired for some time, coma or tetanus with delirium supervenes, preceded by convulsions or pain and weakness over the whole of the body. The skin, in such cases, is commonly cold, the pulse irregular, and the respiration laborious. When the air is but very slightly contaminated by the gas, it may be breathed for a long time without producing any serious symptoms; sometimes there is a feeling of nausea or sickness, accompanied by pain in the head or diffused pains in the abdomen. These symptoms are often observed to affect those who are engaged in chemical manipulations with this gas.

On examining the bodies of persons who have died from the poisonous effects of sulphuretted hydrogen, the following appearances have been observed. The mucous membrane of the nose and fauces, is commonly covered by a brownish viscid mucus. A highly offensive odour exhales from all the cavities and soft parts of the body. These exhalations, if received into the lungs of those engaged in making the inspection, sometimes give rise to very unpleasant symptoms

¹ Treatise on Chemistry. Lardner's Cyclopædia. Art. Sulph. Hyd.

² *Traité de Chimie.* Art. Acide Hydrosulfurique.

and even to syncope or asphyxia. The muscles of the body are of a dark colour, and are not susceptible of the galvanic stimulus. The lungs, liver, and the organs generally are distended by black liquid blood. There is also great congestion about the right side of the heart, and the blood is said not to become coagulated after death. The body rapidly undergoes the putrefactive process. According to the results obtained by Nysten, this gas is entirely absorbed into and circulated by the blood without becoming decomposed, the blood at the same time acquiring a dark pitchy colour. From the nature of the symptoms commonly witnessed, we may infer that its poisonous action is limited to the nervous system both in man and animals.

The most common form of accidental poisoning by sulphuretted hydrogen, for it is rare that a case occurs which is not purely accidental, we have occasion to witness in nightmen and others who are engaged in cleaning out drains and sewers, or in the removal of the soil of privies. Such accidents are much more frequent in France than in England, the soil being often allowed to collect in such quantities in Paris and other large cities before any attempt is made to remove it, that it becomes a highly dangerous occupation for the workmen. According to the results of Thénard's observations, there are two species of compound gases or mechanical mixtures of gases, which are commonly met with in the exhalations of privies. The first compound consists of a large proportion of atmospheric air holding diffused through it in the form of vapour, the hydrosulphuret of ammonia. The hydrosulphuret is contained abundantly in the water of the soil and is constantly rising from it in vapour, and diffusing itself in the surrounding atmosphere. It is this vapour which gives the highly unpleasant odour, and causes an increased secretion of tears in those who unguardedly expose themselves to such exhalations.

The symptoms produced by the respiration of this gaseous mixture, when in a concentrated state, bear a close resemblance to those described as resulting from the action of sulphuretted hydrogen gas. If the person be but slightly affected, he will probably complain of nausea and sickness, his skin will be cold, his respiration free but irregular; the

pulse is commonly frequent and the voluntary muscles, especially those of the chest are affected by spasmodic twitchings. If more seriously affected, he loses all power of sense and motion, the cutaneous surface becomes cold, the lips and face assume a violet hue, the mouth is covered by a sanguineous mucus, the pulse is small, frequent, and irregular; the respiration hurried, laborious, and convulsive; and the limbs and trunk are in a state of general relaxation. If still more severely affected, death may take place immediately; or should the person survive a few hours, in addition to the above symptoms, there will be short but violent spasmodic twitchings of the muscles, sometimes even accompanied by opisthotonos. If the individual be sensible, he will commonly suffer the most severe pain, and the pulse will often become so quick and irregular, that it cannot be counted. Where the symptoms are of so formidable a nature, it is very rare that a recovery takes place. The appearances met with on making a post-mortem examination of the body, are similar to those produced by sulphuretted hydrogen. The inspection should be made with caution, for a too frequent respiration of the poisonous exhalations, may seriously affect the practitioner.

The recognition of these gases, is a very simple operation. The odour which they possess is sufficient to determine their presence, even when they are diluted with a large quantity of atmospheric air. The sulphuretted hydrogen gas is at once identified by its action on paper previously dipped in a soluble salt of lead: if present even in very small proportion, the moistened paper speedily acquires a brownish black stain of sulphuret of lead. The sulphuretted hydrogen may be also thus proved to exist in the vapour of hydrosulphuret of ammonia mixed with air; and the presence of ammonia is indicated in the compound by holding in the vessel containing the gas, a rod dipped in strong muriatic acid; the production of dense white fumes announces the formation of the muriate of ammonia. It is a fact, which cannot be too universally known, that a candle will readily burn in a mixture of either of these bodies with air, which, if respired, would suffice to destroy life.

The second species of deleterious compound present in these exhalations is of a very different nature. It is more rarely met with than the preceding, and consists, according to Thénard, in one hundred parts, of ninety-four parts of nitrogen, two of oxygen, and four of carbonic acid gas. Sometimes the carbonic acid is combined with ammonia, and then it may be regarded, chiefly, as a mixture of nitrogen holding diffused through it, the vapour of carbonate of ammonia, which is sufficient to render it highly irritating to the mucous membrane of the eyes and nose. Its action on the human body when respired, will be readily understood from this statement of its chemical composition. In its operation it must be regarded as exerting an influence essentially negative; for the small proportion of carbonic acid, or of carbonate of ammonia existing in it, cannot be supposed to give rise to the asphyxia which so rapidly follows its inhalation. The chances of recovery are much greater in persons who become asphyxiated from the inspiration of this compound, than in those who are exposed to the influence of the preceding. Commonly the immediate removal to a pure air is sufficient to bring about a recovery; for the asphyxia is originally induced, owing to there being an insufficient portion of oxygen in the mixture to sustain life. Should death take place, it will be found on a post-mortem inspection, that the internal appearances are the same as those which are met with in the examination of the bodies of the hanged or the drowned.

This compound extinguishes a taper :—the carbonic acid contained in it, may be removed by caustic potash, and then it will be seen, that the great bulk of the mixture is formed of nitrogen,—a gas which by its negative properties cannot be easily confounded with any other.

Since the introduction of Coal gas for the purposes of illumination, cases have occurred of individuals connected with gas-works being accidentally suffocated. The coal-gas, as it is termed, is a very compound body consisting chiefly of carburetted hydrogen, but commonly mixed with a greater or less proportion of free hydrogen, nitrogen, carbonic

oxide, and sulphuretted hydrogen. Such a mixture must be regarded as highly dangerous to respire, since the experiments of Davy have proved that, even where the carburetted hydrogen gas is diluted with nearly an equal volume of air, it cannot be introduced into the lungs, without giving rise to very serious effects upon the system. The carburetted hydrogen is a poisonous gas, though its deleterious properties do not appear to be so great as those of the sulphuretted hydrogen. If much diluted with air, no danger commonly results from its respiration: for the men who work in our coal-mines, are generally exposed to an atmosphere of this description, and the use of the safety-lamp teaches us that mining operations may be carried on by these men without danger or inconvenience in situations where, from the quantity of carburetted hydrogen mixed with the air, an explosion would infallibly result unless the safety-lamp was employed.

The circumstances, under which a fatal accident from the respiration of coal-gas takes place, must generally suffice to afford clear evidence of the fact. This gas is known from all others by the bright white light with which it burns, and by the production of carbonic acid and water as the results of its combustion.

It may not be inappropriate to make a few remarks in this place, on the supposed danger of the exhalations given off by a dead body in a state of putrefactive decomposition; although this, it must be confessed, is a subject which more closely appertains to Medical Police. Formerly, there existed a groundless fear relative to the examination of a putrefied dead subject, and during the last century, on several important occasions, medical witnesses refused to examine the bodies of deceased persons, who were presumed to have been murdered, alleging that it was an occupation which might be attended with serious consequences to themselves. Orfila has collected many accounts of the fatal effects which are recorded to have followed the removal of the dead some time after interment.¹ He allows, however, that

¹ *Traité des Exhumations*, Vol. I. p. 2, et seq.

the details of most of these cases, are exaggerated, and attributes the effects which followed to other causes. Indeed the observations of Thouret and Fourcroy prove that these dangers are restricted within a very narrow compass, and that in general the dead may be disinterred and transported from one locality to another, without any risk to those engaged in carrying on the exhumations. About the latter part of the last century, from fifteen to twenty thousand bodies, in almost every stage of decomposition, were removed from the Cimetière des Innocens in Paris, and the accidents that occurred during the operations which lasted ten months, were, comparatively speaking, few. The workmen acknowledged to Fourcroy, that it was only in removing the recently interred corpses and those which were not far advanced in decomposition, that they incurred any danger. In these cases, the abdomen appeared to be much distended with gaseous matter,—if ruptured, the rupture commonly took place about the navel, and there issued a sanious fetid liquid, accompanied by the evolution of a mephitic vapour. Those who respired this vapour at the moment of its extrication, fell instantly into a state of asphyxia and died; while they, who were at a distance, and who consequently respired it in a diluted state, were affected with nausea, vertigo or syncope, lasting for some hours, and followed by weakness and trembling of the limbs. These effects display the influence of a highly deleterious agent on the system, the nature of which, Fourcroy occupied himself in endeavouring to determine. His experiments on the subject, were not attended with any satisfactory results; but he states it as his opinion that it is a compound body, formed of sulphuretted and phosphuretted hydrogen, united to nitrogen and a noxious animal vapour. We must presume that these poisonous effluvia, become decomposed after a time, for no dangerous consequences are observed to follow the disinterment of subjects in which putrefaction is far advanced.

Smothering. This is only a variety of suffocation, and consists in the mere covering of the mouth and nostrils in any way so as to prevent the free ingress and egress of the air. Like drowning, hanging, or strangulation, it produces

death by asphyxia. In newly born infants, it is not an unusual occurrence, sometimes originating in accident and sometimes in criminal design.

Smothering is not often resorted to as a means of perpetrating murder, except in infants or in the debilitated and infirm. Certain trials which have taken place within the last few years, have brought before the public clear evidence that individuals, in a state of intoxication or infirmity, have been murdered by smothering, for the sake of the money derived from the disposal of the dead bodies ! It will be sufficient to mention the trials of Burke and Macdougall in Edinburgh, and of Bishop and Williams in this metropolis, as affording ample evidence of the past existence of this horrible system of murder. The victims were commonly destroyed by the murderer resting with his whole weight upon the thorax so as to prevent the motion of the ribs, and at the same time forcibly compressing the mouth and nostrils by his hands, to prevent the ingress of air. As an accident, smothering may be conceived to take place when an individual falls in a state of intoxication and debility so that his mouth becomes in any way covered, or the access of air to the external outlets interrupted. On an inspection of the body the appearances described under the head of asphyxia, will be met with in the organs of circulation and respiration : hence in a suspected case of murder, we must look for the common indications of all the forms of death by asphyxia and to the circumstances under which the body is found, before we can offer an opinion on the probable cause of dissolution.

CHAPTER V.

LIGHTNING. COLD. STARVATION. FIRE.

LIGHTNING,—On the conducting power of the human body,—effects of Electricity by induction,—conducting power modified by the nature and height of objects,—by humidity.—Wounds and other marks of violence produced by Lightning,—cause of death,—post-mortem appearances,—coagulation of the blood,—cadaverous rigidity,—putrefaction,—death by the returning stroke.—whether death has taken place by Lightning or not,—case of Professor Richman,—accident at Châteauneuf-les-Moustiers,—recent cases.—**COLD**,—cause of death,—influence of severe cold on the vascular and nervous systems,—its effects on the respiratory function,—death from cold accelerated by fatigue, exhaustion or habits of intoxication,—power of the body to resist cold,—post-mortem appearances,—decision from presumptive evidence.—**STARVATION**,—influence of age and sex on the power of abstinence,—symptoms consequent on the absolute or relative privation of food,—period at which death ensues,—case of Engeltje Van der Vlies.—Suicide by voluntary starvation,—cases of Viterbi and Granet,—post-mortem appearances,—value of medico-legal evidence founded on them,—starvation from diseased growths about the fauces.—Homicide by starvation.—**FIRE**—cases of murder by burning,—appearances assumed by severe burns inflicted during life or after death.—Human combustion,—medico-legal question,—case of Millet,—phenomena accompanying the combustion of the body,—case of Grace Pett,—contact with ignited bodies necessary.—Spontaneous Combustion of flax, cotton, and charcoal.

LIGHTNING.

Death by Lightning is sufficiently common to require that the medical jurist should be prepared to understand the phenomena which accompany it; but there is a more important reason why he should devote his attention to this subject,—which is, that the appearances, left by the electric fluid on the human body, sometimes closely resemble those produced by extreme mechanical violence. Thus a person may be found dead in an open field or in the highway,—his body may present the marks of contusion,

laceration or fracture, and to one unacquainted with the fact that such violence occasionally results from the passage of this subtle and invisible agent through the animal system, it might appear that the deceased had been murdered.

That the human body may serve as a conducting medium to the electric current, is familiarly known; its degree of conducting power, however, has been variously stated. From the fact, that when insulated, it readily receives and retains electricity, and that when not insulated, it readily parts with it to the earth without retaining the slightest portion, we are justified in inferring that it is a very good conductor. According to Edwards, the nervous system of a living animal is capable of conducting the electric fluid with almost the same degree of facility as a rod of metal¹;—whether this be the case or not, it is certain that the chief effects of electricity are manifested on the nerves. It is unnecessary to enter into a detail of the experiments which establish the identity of artificial with atmospheric electricity,—the only difference which is now admitted by philosophers to exist between them, consists in the extreme intensity of the latter. The reasonings which are applicable to the one, are applicable to the other; and, therefore, in investigating the phenomena of death by lightning, we are at liberty to appeal to the results obtained by experiments on animals with the electrical machine, in order to illustrate our views. According to the theory of Franklin, which, although not perfectly unobjectionable, is very commonly adopted in this country, there is but one species of electric fluid that pervades all bodies, the existence of which can only become known to us by a disturbance of the natural equilibrium. A body which contains more than its ordinary portion of electricity, is said to be positive, while another which contains less, is said to be negative. The electric equilibrium of bodies, however, has only an imaginary existence, for there are few physical or chemical phenomena which do not cause a disturbance of it; but these minute changes are imperceptible to us and are unimportant in relation to the present inquiry. When a body in a state of

¹ De l'Influence des Agens Physiques sur la Vie, p. 533.

positive electricity, is brought near to others, it has a tendency, in the language of the above theory, to draw to and concentrate within itself the respective electricities of these latter, and render them highly negative, whether the bodies so influenced be insulated or not. This is what is called electricity by induction, and it sufficiently explains to us why bodies which are known to possess good and bad conducting powers, are often indiscriminately struck during a storm. When the electric equilibrium is disturbed, there is a strong tendency to its restoration by that substance which contains an excess of the electric fluid, or is highly positive, parting with the surplus portion, so as to supply the deficiency in the substance which has been described as negative. During a storm there are very rapid alterations in the electric condition of the atmosphere,—at one moment a vast mass of vapour may be in a highly positive state, while after the lapse of a very short interval, it will give strong evidences of negative electricity. Sometimes the equilibrium is restored by currents of electric matter passing simply between clouds which float in the atmosphere, giving rise to the phenomena of lightning and thunder. At other times the disturbance of the equilibrium is so great in a detached mass of clouds, that in passing near to the earth, it will transmit its excess of electricity, if it be positive, through bodies situated on the surface, or if negative, receive through such bodies, a sufficient quantity from the earth to restore the equilibrium. It is during these rapid interchanges that the dangerous effects of electricity on man and animals are manifested to us. Now of all bodies situated on the soil, those which are the loftiest, are commonly the media of conduction. If, however, two of nearly equal height be in the vicinity of each other, that which possesses the best conducting power, generally receives the current. Thus, if a tree and a house be of nearly equal elevation, the tree from its being impregnated with moisture possesses a higher conducting power, and will, *cæteris paribus*, more readily receive the discharge.¹ An individual who shelters himself under a tree during a

¹ POUILLET. *Elémens de Physique*, Tome II. Liv. ix.

storm, may by his body form part of the channel of communication, and thus it is that accidental death from lightning frequently occurs. The imprudence of such a practice is fatally demonstrated by most of the recorded casualties of this nature. Beudant advises that a person should place himself about six yards from the foot of a tree during a storm as a measure of safety, on the principle that if the current should be transmitted to the earth, the tree would be struck in preference to the human body.¹ The safer plan is to avoid the proximity of all trees and shrubs, since in accumulated electricity, there is very often a sudden transference of the current from one conductor to another in the vicinity. In electricity by induction, the effects which follow are sometimes very singular, and apparently irreconcilable with our common notions of electric action. Accidents have happened to persons when there have been trees and other lofty objects in the neighbourhood sufficient to carry off the discharge, but which did not form part of the circuit. One or two cases will be presently related in illustration of this. Again, when a building is struck, those materials which are the best conductors, as for example metallic bodies, are generally selected by preference, and it matters not whether these substances be concealed or exposed; for no obstacle appears to be capable of arresting the course of an electric current when the disturbance of the equilibrium is to be ascribed to induction. A concealed nail will be torn out of a solid mass of masonry, a door will be thrown off its hinges, a knife or a coin in a man's pocket will be, as it were, selected by the electric fluid for the expenditure of its force, how closely soever such articles may be surrounded by other objects; and yet all these effects which figure as marvels in most reports of death by lightning, are easily explicable and intelligible by a reference to the well-known laws of electric induction.

Water is not commonly regarded as a good conductor of electricity, but it seems to be certainly established that bodies which are impregnated with moisture readily afford a passage

¹ BEUDANT. *Cours des Sciences Physiques. Partie Physique*, p. 625.

to it.' Thus of two individuals standing near each other during a storm, if the clothes of one are wet, while the clothes of the other are dry, the body of the former is more likely to serve as the recipient and conductor of the electric current. So of two persons equally exposed, the one standing near a sheet of water, and the other on dry ground at a distance, the former may be more readily struck. A person who is on an open plain, or in a field far from any trees or other conducting media, is by no means secure. His body may be the loftiest object in the neighbourhood, and thus may become the medium of passage to an electric current, when the disturbance of the forces is great. The recumbent position would afford the best chance of escape, since in such a case the body forms part of the surface of the soil. Independently of the influence derived from the conducting powers and elevation of objects on the surface, we ought not to lose sight of the fact, that the nature of the ground on which a person is standing may, to a certain extent, affect the result. Thus it is not unreasonable to suppose that, if, some feet below the surface, there should be extensive metalliferous strata, a cloud highly charged with electric fluid and passing over the spot, would, *cæteris paribus*, strike more rapidly, and with greater force, than if such strata were absent. So in the same way, the dryness or humidity of the strata may retard or accelerate the shock which would accompany the restoration of the equilibrium.*

We have now to consider the effects of electricity when

* The influence of humidity in increasing the conducting power of organic matter, is well illustrated in the account given us of the original experiment of Franklin, in drawing electricity from the atmosphere. The kite which he employed was elevated by a common hempen cord, and the philosopher was already beginning to despair of success, when a shower of rain fell:—the rain wetted the fibres of the string, and increased its conducting powers to such an extent, that sparks were then easily obtained. In short, it is now well known, that the worst conductors when dry, acquire very good conducting powers when wet.

† POUILLET, Op. cit. loc. cit. The influence ascribed to the soil appears only a consequence of the common theory of electricity. I am not aware that it is supported by any facts. The subject is worthy of attention.

transmitted. An individual may be struck by the electric current, and death may not be a consequence ; he may recover after a time from the shock. In some instances, persons have been in close contact with others who have been struck and killed on the spot, and yet they have sustained no injury. One person may be, as it were, singled out of a crowd and killed, while those who surround him may remain unaffected. On other occasions, it is true, a number of people collected together have been involved in the same shock, and all have been more or less injured.

The effects produced by an electric current will depend upon the quantity and intensity of the electricity ; they may be of a mechanical or chemical nature. The mechanical effects are sometimes incredibly great. Thus where a person is killed in an apartment, the furniture is usually much displaced and broken ; bars of iron, though strongly secured in the walls, are not unfrequently loosened or torn out. In the open country, enormous trees are cleft from the summit to the base, and their branches torn and scattered to a considerable distance. The ground is also often torn up around the spot which receives the charge. When a human being is struck, the mechanical violence is not less remarkable ; the clothes are often rent and displaced, the body lacerated and sometimes the bones are broken. Pouillet mentions an instance, in which two individuals were killed by lightning, and the skull of one was so much fractured, that it looked as if it had been beaten in by a bludgeon. Among the chemical effects may be mentioned, the fusion of metallic substances about the person, the ignition of the clothes or the ignition of any combustible materials in a building upon which the electric current has expended itself. The heat evolved by electricity appears to be in proportion to the resistance opposed to the passage of the current ; and thus combustible bodies are most readily ignited, which are struck after the current has passed through some imperfectly conducting channel. They who have recovered after having been struck, have not always experienced a feeling of heat ; in fact, they have not commonly been sensible of any of the circumstances which accompanied the shock.

I. Cause of death. When death takes place from lightning, it is commonly immediate; if the person struck survive the first shock, there is great hope of preserving life. Many theories have been brought forward to account for death under these circumstances. John Hunter supposed that the electric current, in passing through the body, produced an instantaneous and entire annihilation of the vital principle. According to Sir Benjamin Brodie, death takes place precisely in the same manner as from a severe injury to the head.¹ Dr. Edwards considers that the fatal influence of the electric fluid is confined to the brain and nerves; and that death results, in these cases, from a forcible separation of the molecules composing the nervous fibres, in consequence of which, the nervous system is no longer capable of transmitting its influence throughout the body; in other words, he regards the presence of the electric fluid in the brain and nerves as giving rise to a certain disorder in the functions of these organs, sufficient to produce death.²

Many attempts have been made to determine, by experiments with the battery, the precise mode in which electricity destroys life. Mr. Singer found that a strong charge passed through the head, gave him the sensation of a violent but universal blow, followed by a transient loss of memory and indistinctness of vision. Müncke states that he saw an instance, where a full grown man, who had received in his arms and thorax the charge of a jar of not more than two square feet capacity, fell and remained in a state of perfect insensibility for an hour; and he remarks, that the full charge of a jar of ten square feet capacity, would probably suffice to cause instant death in an adult, if the shock were transmitted through the head.³ There is some difficulty in performing these experiments on animals, because the

¹ PARIS and FONBLANQUE, Vol. II. p. 65.

² EDWARDS, Op. cit. p. 541.

³ MUENCKE. Handbuch der Naturlehre, p. 776. This philosopher attributes death to the violent impression produced on the nervous system. He says, "Die Ursache liegt, wie beim Blitze, in einem Ueberreitze der Nerven."

electric fluid very often disperses itself over the surface of the body, instead of traversing the interior, and of course, in such a case, it is unattended with any particular effects. The results of such experiments, however, where they have succeeded, shew that the chief influence of this agent is confined to the cerebro-spinal system. A charge passed through the head of a bird, was found to destroy the functions of the optic nerve and induce perfect blindness. If a moderately strong charge be passed down the spinal column of a person standing, there is commonly such a prostration of strength that he falls to the ground. If a charge be passed through the whole length of the body of an eel, the animal is instantly killed; but when only a part of the body receives it, the destruction of irritability is confined to that part.

Such are the consequences of the passage of a current of electric fluid through the body; but the facts will scarcely allow us to offer a conjecture as to the mode in which it causes death. That the nervous system is the part chiefly, if not solely, affected by it can hardly be doubted; and when we say that it is by the shock, or violent impression thus produced, that life is extinguished, we advance as far as the present limits of our knowledge will allow us in attempting to explain its fatal operation on the body. How the electric fluid acts on the molecules of the brain and nerves it is impossible for us to determine.

II. *Post-mortem appearances.* Generally speaking, the body, externally, presents marks of contusion and laceration about the spot where the electric current entered;—sometimes a severe lacerated wound has existed: on other occasions there has been no wound or laceration, but a very extensive ecchymosis, which, according to Mayer, is most commonly found on the skin of the back. I have not met with the account of any case where the appearance of a burn has been produced by the direct action of a stroke of lightning, for in those instances in which the marks of burns have been found upon the body, it appears that ignition of the clothes had taken place, to which alone the burning was to be ascribed. Some observations have already been made upon this subject, but it may here be remarked, that ignition of the clothes is

far from being a usual attendant on the passage of a current of electricity through the human body; and it is well known, that trees are commonly struck and shattered, without being inflamed, or even in any degree carbonized.¹ Fractures of the bones have not been commonly observed;—in a case mentioned by Pouillet, the skull was severely fractured.

The blood is said not to become coagulated in the bodies of those killed by lightning, while the muscles of such subjects are described as being constantly in a state of perfect relaxation, and never displaying any appearance of cadaverous rigidity. These statements have been chiefly promulgated upon the authority of Hunter, and we find them continually repeated in physiological works, but without any attempt being made to confirm them by an appeal to actual observation. In regard to the coagulation of the blood, it would be proper to know the exact time, and the whole of the circumstances under which the examination of the body was made, before we ascribed the fact of its being found in a fluid state after death in a few subjects, to a specific operation of the electric agent. Besides, it is evident that a very large number of cases should be examined at different periods after death, before a physiologist would be entitled to make so sweeping a generalization.

Death by lightning is not so frequent as to place it within the power of physiologists to examine the subject readily for themselves, and until a more rigorous investigation of its phenomena is made, we may be permitted to doubt, whether the observations upon which Hunter rested his statements were sufficiently numerous or satisfactory to justify us in admitting them. These accidents, moreover, commonly occur at a season of the year when the process of decomposition is hastened by the high temperature of the air, and a sufficient time may elapse before the post-mortem examination of a body is made, to allow the blood to pass from a coagulated to a liquid state. Besides

¹ An electric current will not ignite some of the most easily combustible substances, unless its passage be retarded by an imperfectly conducting medium. The strongest electric spark will perforate *amadou*, but will not ignite it; and a very powerful charge may be passed through a mass of gunpowder without exploding it.

experiments carefully performed, have shewn that blood, through which electric discharges have been transmitted, will coagulate as quickly as that which has not been electrified; and further, Sir C. Scudamore discovered that, on examining the bodies of animals killed by the discharge of a powerful galvanic battery, the blood in the veins was always in a solid state.¹ There is obviously, therefore, nothing in the action of the electric fluid to retard or prevent the coagulation of blood; and this renders it probable that the fluidity remarked by Hunter in cases of death from lightning, depended upon other causes. Similar remarks might be made relative to the alleged absence of cadaverous rigidity; many circumstances may accelerate or retard the accession of this state in the dead muscle,—it may take place and disappear quickly, and the subject may not be seen at that particular time by the medical examiner. Here again experiment is against the statement of Hunter, for Sir B. Brodie observed that the body of an animal killed by electricity became, as usual, rigid after death.²

Putrefaction is also said to be hastened in these subjects; but putrefaction is modified by so many varying circumstances, and death by lightning usually takes place during summer when the process is most readily developed, that we ought to have a full detail of all the conditions to which the body has been subjected, before we assent to this doctrine. For many years it was a matter of implicit belief, that arsenic, when it operated fatally as a poison, accelerated the putrefaction of the body, but careful observations have since shewn that its effect is precisely the reverse. So in regard to electricity, it may or may not accelerate putrefaction; but cases have not yet been reported in sufficient number, or with sufficient clearness of detail, to enable us to decide the question either in the affirmative or negative. Most of these opinions, respecting the effects of electricity on the body, are to be ascribed to the hypothesis of Hunter, namely, that it acted by producing an entire annihilation of the vital principle! This literally signifies nothing more

¹ TURNER'S Chemistry, p. 897.

² PARIS and FONBLANQUE, Med. Jur. Vol. II. p. 63.

than a sudden destruction of life, and there is no reason, *a priori*, why death should not be followed by the same phenomena as where an individual is instantaneously killed by a violent injury to the brain, or by any other cause operating with equal suddenness and effect.

The appearances met with internally, according to the very imperfect accounts which have been published, have not presented any change calling for particular attention. Those members of the profession to whom such cases might hereafter occur, would render an important benefit to science by publishing their observations. Our knowledge of the pathological effects produced by lightning, when operating fatally on the system, is at present limited to a few scanty reports, and most of the details given, require to be corroborated by future observers.

In some instances, no marks of violence have been observed on the body, and death has taken place while the individual was situated at a considerable distance from the spot which received the charge. The explanation of the manner in which death ensues in such a case, according to the common theory, is thus given :—One extremity of a long series of clouds, highly charged with electricity, will of course induce the opposite state in the other extremity, which may be by accident placed within a short distance of the ground. Now, if the electric fluid from the positive end should be discharged, a portion of electricity will pass upwards from the earth through the body of a person situated under the negative portion of the cloud, in order to restore the equilibrium: this individual may be instantaneously killed, while another, much nearer to the object struck, may remain uninjured, because his body does not happen to be sufficiently near to the negative extremity of the cloud to serve as a channel for the passage of the current. Some have called this the “ascending,” and others the “returning” stroke. It is generally admitted that, although adequate to produce death, its effects upon the objects through which it passes are much less violent than those of the direct stroke. Pouillet observes, that he has never known an instance of its producing any marks of injury on the bodies of animals,

or of its giving rise to the ignition of combustible substances.' The medical jurist will perceive from this, that a person might be killed under circumstances, which would scarcely give rise to a suspicion of the real cause of death.

Lastly, we may have to determine—

Whether death has taken place by lightning, in a person found dead whose history is unknown?

This question will probably be best elucidated by the recital of a few cases. The first which I shall mention is that of Professor Richman, of St. Petersburg, who was killed in the year 1753. This unfortunate philosopher was engaged in some experiments upon atmospheric electricity, with his engraver, Sokolow. Having placed himself near the apparatus during a storm in order to examine the electrometer, a large ball of fire appeared to flash from the conducting rod to the head of the Professor, and he instantly fell lifeless. On examining the body, there was found a single red spot on the forehead at the point where the electric current entered; it appeared to have completely traversed his body, bursting open his shoe, and singeing part of his dress, but without producing any other marks of violence on his person. The furniture in the apartment was much injured.

The following case was reported to the Academy of Sciences, by M. Trancalve, and an account of it is to be found in Pouillet's work already referred to.

In July, 1819, the electric fluid struck the church of the village of Châteauneuf-les-Moustiers, situated on one of the summits of the Lower Alps. Divine service was being performed, when three loud claps of thunder were heard, the missal was suddenly torn out of the hands of a person officiating, and, at the same instant, this person with the curate and the greater number of the congregation was violently thrown down and all were more or less injured. The curate who was taken up in a state of insensibility, was soon restored by the application of proper means. On examination it was found, that the electric current had first struck the gold lace on the

¹ *Traité de Physique. Art. Electricité Atmosphérique.*

upper part of his dress, thence it had taken its course down his body, producing some severe injuries, and probably the greater part of it escaped by the seat on which he was sitting, for this was found broken in pieces. A portion of the current had gone down to his foot, had broken the metallic buckle of the shoe which was torn open, and had transported it to some distance. The arms of this person remained in a state of paralysis for two months afterwards. Eight individuals were killed on the spot, and eighty-two were more or less injured, a great number of whom suffered from paralysis of the legs. One of the priests, who was dressed in a silk robe, escaped without any injury.

The steeple of the church was subsequently found at some distance from the spot, and the floor of the chapel was pierced in several places by large holes, through which it is supposed the electric current had passed into the earth.

The following case is of very recent occurrence :

In May, 1835, a boy aged thirteen, while standing at the door of a school-room in Walcot-place, Lambeth, during a storm, was killed by lightning. At the time of the occurrence of the accident a loud report was heard, and the building was shaken to its foundation. On examining the body, there was found a black mark on the neck near the right ear, from which there was a slight trace of injury down the right side of the body. His clothes were torn to his skin by the action of the fluid, and the part of the floor on which he stood was burnt, which accounted for the smoke seen at the time he was struck. It appeared, that in this case the electric fluid had first struck the house, for some of the bricks were found to have been violently displaced ; and the body of the deceased had served to form part of the channel of communication. Another boy who was standing close to him at the time of the accident, sustained no injury.

A very interesting case, shewing the effects of electricity on the human subject, but not accompanied by a fatal result, was recently reported in the *Philosophical Magazine*.

A lady and gentleman were travelling in their carriage over the Abberley Hills, in the month of April, 1831. The fineness of the weather had induced them to ride on the barouch-

seat. A heavy cloud was hanging over them at some distance, and a shower of rain suddenly came on. The gentleman was in the act of raising an umbrella, when a flash of lightning struck them both senseless and threw the horses on the ground. The servants who were inside, were for some time ignorant of the cause of the accident. The man stated afterwards, that he heard no thunder previously, but that a vivid light appeared to proceed from the side of the road, accompanied by a report similar to that of a blunderbuss. He soon perceived, however, that his master was hanging apparently lifeless over the seat; he got out and assisted in extinguishing the fire which was consuming his dress; his master very soon recovered from the effects of the accident.

The passage of the electric fluid as connected with the lady, was very distinctly traced. It had first struck the umbrella which she held, the springs in the handle were forced out, the wires broken and the cotton covering torn to pieces. It is worthy of remark, however, that it had no ferule or metallic point. From the umbrella, the current passed to the wire surrounding her bonnet, and entered her body just above the left eye, singeing the hair: after passing round the back of the head and above the left shoulder, it reached the steel busk of her stays, producing in its course a painful but not a deep wound and affecting the hearing of the left ear. The paper case in which the busk was contained, was perforated at the upper and lower part, indicating the points of entrance and exit of the current, and opposite to these openings the steel had been fused, presenting a blistered appearance. It was subsequently remarked that the metal had acquired powerfully magnetic properties. Both ends attracted strongly the south pole of the needle, while about two-thirds of its length downwards the north pole of the needle was attracted: two pair of scissors, which were contained in a box in the carriage, were also found to be magnetic.

There were marks of burning on her clothes, which were completely pierced through to her thighs; the electric fluid

produced very severe wounds in these parts, but none of them presented any of the characters of burns. Every article on which she was sitting, was perforated to the cushion, through which the current must have passed, the perforated parts having a singed appearance. Both herself and her husband were unconscious of any light or sound occurring at the time of the accident.

With regard to the husband the course of the electric fluid was not less singular. The umbrella which he was in the act of raising, had served as the conductor to his body. His hat was slightly pierced and his hair singed; but the main force of the shock passed down his left arm, severely injuring the left hand. It fused the gold shirt-buttons, forcing them together with part of the shirt, to a considerable distance, and leaving a deep wound in the wrist. His coat was torn open as far as the elbow, at which point the electric fluid had passed to a knife contained in his waistcoat-pocket, which was torn from its situation and afterwards found on the ground. A severe wound was produced in his side, and every article of dress was torn away as if by gunpowder. From the knife it had passed to the iron of the seat wounding his back, and setting fire to his clothes in its passage. A gold pencil-case, which was in the right pocket, was partly fused, and a cornelian seal forced out of it. The electric current, after passing to the back of the seat, and bending and displacing the iron, appeared to have diffused itself over the whole of the carriage, and then to have passed by the tires of the wheels into the ground. Four large holes were discovered in the road, corresponding to the points on which the wheels were supposed to have rested at the time of the accident. The balance-wheel of this gentleman's watch was found to be so magnetic, that when floated on water by means of a cork, it served the purpose of a compass.

One of the horses was killed; and, on inspecting the body, there was found to be merely an indentation on the skull, opposite the brass front of the bridle. The muscles of the neck and flanks were slightly discoloured, but no other injuries were perceptible.

This accident occurred on elevated ground, but there were many spots in the neighbourhood more elevated, and the road itself in which the carriage was passing, was excavated so that the sides were nearly on a level with the summit of the carriage. Within a few yards of the spot where the shock took place was a lofty pear-tree; which, however, bore no marks of injury. The holes produced in the road by the electric fluid were perfectly round, about fifteen inches in diameter and nearly the same in depth,—the stones appeared to have been thrown out of them as if by a miner's blast.

Sometimes if the ground on which the electric fluid strikes be of a silicious nature, there may be marks of fusion. The following curious case was published by Dr. Withering in the *Philosophical Transactions* for 1790.

In September 1789, an oak was struck by lightning, and a man, who had taken shelter under it, was killed. A walking-stick used by the deceased, seemed to have served as the principal channel for conducting the electric fluid into the ground. At the spot where the stick appeared to have rested, there was found to be a hole five inches in depth and two and a half inches in diameter, which contained merely a small quantity of burnt stubble. On digging more deeply the ground was found to be discoloured to the depth of ten inches below the hole, and still lower a mass of sandstone was discovered which had been evidently fused by the action of the lightning.

The recital of these cases will suffice to shew to the medical jurist, that the grounds upon which he will have to form his opinion in such investigations, are but slight. The circumstances under which the body is found, coupled with the known occurrence of a storm, will often afford stronger evidence than the facts elicited by a medical examination. The appearance of surrounding objects,—the marks of fusion or ignition in fusible or combustible substances, and the state of the dress, must here supply the place of pathological characters, which, if they exist, are not sufficiently defined to be made available as evidence of this species of death.

The possession of *magnetic polarity* by any articles of steel found about the person, might in some instances, serve to corroborate the suspicion of death by lightning.

COLD.

I. Cause of death. The protracted exposure of the human body to a very low temperature may become a cause of death, and although in this country, cases but rarely occur in which cold alone operates fatally, it is not unusual during a very severe winter to hear of persons being found dead in exposed situations and in a state of misery and destitution. On these occasions, we may reasonably suspect that the want of proper food and nourishment has accelerated death. It is, however, convenient to make a distinction between the effects of cold and of inanition on the system, as the symptoms preceding death and the rapidity with which that event takes place, are very different in the two cases.

A moderate degree of cold is well known to have an invigorating effect upon the body, but if the cold be severe and the exposure to it long continued, while the calorific function is not maintained by warmth of clothing or exercise, the skin becomes pale and the muscles become gradually stiff and contract with difficulty, especially those of the face and extremities. Sensibility speedily disappears,—a state of torpor ensues, followed by profound sleep from which the person cannot be readily roused: in this state of lethargy, the vital functions gradually cease and the individual finally perishes. Such are the general effects of intense cold on the body.

The action of cold on the vascular system, is to drive the blood from the surface to the interior: the skin is pallid while the great vessels of the spleen, liver, lungs, and brain are more or less gorged with this fluid. The average temperature of the blood is lowered,—the heart contracts slowly and feebly upon the accumulated mass of fluid, and the pulse is small and thready, shewing that the volume of the larger blood vessels becomes lessened. According to Dr. Clendinning, priapism is an effect of exposure to

extreme atmospherical cold, which he attributes to venous congestion taking place in the erectile tissue of the penis.¹

The effect of cold on the nervous system is seen in the numbness, torpor and somnolency which have been described as consequences of a long exposure to a very low temperature. Giddiness, dimness of sight, tetanus and paralysis, in some cases precede the fatal insensibility which involuntarily steals on the individual. It was observed by Beaupré, on the occasion of the celebrated retreat of the French from before Moscow, that those who were affected by cold often reeled about as if in a state of intoxication,—they also complained of vertigo and indistinctness of vision, and sank under a feeling of lassitude into a state of lethargic stupor from which it was found impossible to rouse them. Sometimes the nervous system was at once affected;—tetanic convulsions, followed by rigidity of the whole of the voluntary muscles seized the individual, and he rapidly fell a victim. Symptoms indicative of a disturbance of the functions of the brain and nervous system, were also experienced by several of our Arctic travellers during their residence within the Polar circle.

The action of extremely cold air suddenly introduced into the lungs is not well understood. Death is stated to have taken place instantaneously from this cause, and it has been presumed that its fatal operation is due to the sudden arrest of the chemical phenomena of respiration.* When the exposure takes place slowly, the admixture of the cold atmosphere with the warm air contained in the bronchial cells, and possibly the increased exercise of the calorific function, combine to retard the accession of fatal consequences; but if the exposure to cold air continue, a fatal result cannot be prevented. It is impossible for us to determine whether in this kind of death, the torpor arises from the circulation of an imperfectly decarbonized blood through the brain, or whether there be at once an impression produced on this organ by its sympathy with the skin. We

¹ Medical and Physical Journal, July, 1832.

* Ibid.

have no evidence to shew that the chemical changes in the blood are arrested by a low temperature in the air which is respired, and it is not improbable that the disturbance in the respiratory function may be a consequence of the disordered state of the nervous system. The manner in which cold operates fatally is therefore obscure ; we can only say that it depresses the action of the nervous system, so far as to arrest the calorific function. The animal has no longer the power of generating heat,—the blood becomes stagnated in the larger vessels, and the circulation is finally arrested.

II. *Time at which death may take place.* The period at which an individual may die from exposure to cold will vary according to circumstances. It is well known that some constitutions are more susceptible than others of slight changes of temperature, independently of the existence of disease or infirmity. We have great reason to believe that the faculty of generating animal heat is very different in different subjects, and to this may we ascribe many apparently inexplicable statements relative to the effect of cold on individuals exposed under the same circumstances. Captain Ross remarked during his late expedition, that the power of resisting a low temperature, was very different among the members of his crew,—it was always easy, he observes, after a little practice to predict who would suffer from degrees of cold which others would despise. He attributes this, and it appears to me with physiological correctness, to the variable power of the calorific function in different constitutions.¹ This being admitted, it is evident that one person might sink and perish much more rapidly than another at the same temperature, as also that a degree of cold might prove fatal to one and be borne with impunity by another.

Besides this difference in constitution, there are other conditions which may accelerate death from cold. In all cases where there is exhaustion of the nervous system, as in the aged and infirm,—in those who are worn out by disease or fatigue,—or, lastly, in those addicted to the use of intoxi-

¹ CAPTAIN ROSS'S Second Voyage of Discovery to the Arctic Regions.

cating liquors, the fatal effects of cold are much more rapidly manifested than in others, who are healthy and temperate. The experience of our army surgeons during winter service in cold countries, as well as that of the French surgeons during the Russian Campaign in 1812, proves that whenever the nervous energy is impaired either by intoxication or exhaustion from fatigue, the subject falls an easy victim to cold. This we might readily anticipate from the very close connection which is now admitted to exist between the power of generating heat and the integrity of the functions of the nervous system. The exposure of persons in a state of intoxication during a severe winter, might therefore suffice to destroy life, although the cold might not be so intense as to affect others who were temperate. Casualties of this nature sometimes occur during the winter season in this metropolis; and a knowledge of the influence of intoxication in accelerating death under such circumstances, may occasionally serve to remove any doubt in the mind of the practitioner as to the real cause.

It has been remarked by Dr. Edwards, that the animal body can only become cooled in the atmosphere in three different ways;—by cutaneous exhalation,—by conduction from the direct contact of air,—and by radiation. The loss of caloric by radiation would be the same in vacuo as in air, it is therefore entirely independent of the gaseous medium in which the body is immersed. A renewal of air, as on exposure to a cold brisk wind, does not affect the loss of caloric by radiation, but the body becomes rapidly cooled in consequence of the loss of caloric by conduction, and if the air be dry by the increased evaporation from the cutaneous surface. To these combined causes, must we attribute that feeling of coolness which we experience when there is no other change in the condition of the atmosphere than that depending on the rapidity of its motion: the thermometer at the time remaining stationary. This fact then, shews that the motion of the atmosphere may give rise to the same results with regard to our feelings as an absolute depression of the thermometer. From the observations of Franklin,

Parry, and other travellers in the Arctic regions, we learn that they could easily bear a degree of cold equal to 40° or 50° below the zero of Fahrenheit, so long as the weather remained calm; but when the air was agitated by a slight breeze, their sufferings became intolerable, notwithstanding the thermometer usually rose in windy weather. By careful observation it was determined on one of these expeditions, that when during calm weather, the thermometer stood 51° below zero, the party suffered no more than when during a fresh breeze, it rose to zero, so that the mere motion of the air produced on the body, in spite of the absolute rise of the thermometer, a feeling of cold equal to 51° depression. In short there was no longer any correspondence between their feelings of heat or cold and the rise and fall of the instrument.¹ The expedition of Captain Franklin has proved that the human body is capable of supporting a very low temperature without injury, provided due precautions are taken. The lowest point of the thermometer observed by this traveller, was at Fort Franklin on the Great Bear Lake, lat. 66° N.—Jan. 26, 1826.—The instrument stood 58° below zero or 90° below the freezing point of water. Mercury was cast into bullets by pouring the liquid metal into a bullet mould and exposing it only for a few seconds at the door of the hut!

The hygrometric state of the air will also affect its cooling power. Air which is perfectly dry, cools the body by increasing the evaporation from the cutaneous surface: air which is saturated with humidity cools the body by its possessing a better conducting power than dry air. Dr. Edwards states that he has not found much difference between the absolute degrees of cooling power over the animal body possessed by dry or humid air, at the same time admitting that the manner in which they affect it is as above stated. It is certain that a damp cold wind will cool the body more rapidly than if there were a considerable fall in the thermometer, in a calm and moderately dry state of the atmosphere. A case is related by Dr. Currie in the Philosophical

¹ De l'influence des Agens Physiques, p. 391.

Transactions for 1792, which shews the fatal effects of cold winds accompanied by humidity. "Of several individuals that clung to a wreck, two sat on the only part that was not submerged; of the others, all were constantly immersed in the sea, and most of them up to the shoulders. Three only perished, two of whom were generally out of the sea, but frequently overwhelmed by the surge, and at all other times exposed to heavy showers of sleet and snow and to a high and piercing wind. Of these two, one died after four hours exposure,—the second died three hours later, although a strong healthy adult and inured to cold and hardship. The third that perished was a weakly man. The remaining eleven who had been more or less completely submerged, were taken from the wreck next day after twenty-three hours exposure, and recovered. The person among the whole who seemed to have suffered least was a negro: of the other survivors, several were by no means strong men, and most of them had been inured to the warm climate of Carolina."

III. *Post-mortem appearances.* Opportunities rarely occur of examining bodies, when death results purely from exposure to cold. The surface is commonly pallid and the viscera of the chest and abdomen, as well as the brain, are congested with blood. Dr. Kellie, of Leith, has described in two cases which he examined, a redness of the small intestines from turgescence of the capillary vessels, and a great effusion of serum into the ventricles of the brain. A sufficient number of cases have not yet been inspected to enable us to determine how far these two last-mentioned appearances are to be considered as concomitants of death from cold: but all observers have found a general congestion of the vascular system internally. In consequence of the great turgescence uniformly met with in the vessels and sinuses of the brain, some pathologists have regarded death from cold as resulting from an attack of apoplexy; but the symptoms which precede death do not bear out this view. Extravasations of blood have not been met with, and the mere fulness of the cerebral vessels after death, is not in itself sufficient to justify this opinion. Dr. Paris states, on the authority of Sir B. Brodie, that the blood is generally

florid in the aorta and in the left cavities of the heart. This may be the case where the thorax is speedily opened in animals submitted to experiment, but we should scarcely expect to find the blood of any other than a dark colour in the examination of a human body where death has resulted from cold. The observations of Sir B. Brodie would tend to shew that the animals experimented on by him, must have died suddenly, as in a mortal syncope; but in most recorded cases of the loss of life by cold, we have evidence that the access of death was slow, and in such, therefore, a florid state of the blood in the aortal system, could not possibly exist. In most of these post-mortem examinations, the body has been described as perfectly fresh,—the viscera sound and healthy and the muscles firm and of a florid colour. These appearances are of a casual nature, for the freshness of a subject will depend upon the length of time and the circumstances under which it has remained exposed: the florid colour of the muscles must also be attributed to the exposure of these organs to the air when the inspection is made soon after death.

Thus then the medical jurist will perceive that to come to a decision *whether*, on the discovery of a dead body, *death has taken place from cold or not*, is a task of great difficulty. The season of the year,—the place and circumstances under which the deceased is found,—together with the absence of all other possible causes of death, such as from violent injuries or internal disease, form the only basis for a medical opinion. Death from cold is not to be determined except by negative or presumptive evidence, for there is no organic change either externally or internally, sufficiently characteristic of it, to enable us to decide positively on the subject.

STARVATION.

Death from the mere privation of food is an extremely rare event, although if we were to form an opinion from the verdicts of juries, its occurrence would not appear to be so uncommon in this and other large and populous cities. Such cases must, however, be received with some distrust,

as care is rarely taken to ascertain precisely how far bodily disease may have been concerned in the death of the party. Still it cannot be denied that hunger should be classed among the causes of violent death, being sometimes the result of criminal neglect or inattention in the treatment of children or of infirm and decrepid persons, and thus constituting homicide, or at other times, although very rarely, arising from an obstinate determination to commit suicide in those from whom all other means of self destruction are cut off.

The loss which the body is constantly sustaining in the formation of the various excretions, and the manifest necessity which exists for the continual supply of materials, in order that the process of nutrition should be maintained, render it absolutely necessary that food should be furnished to the system at no very distant intervals. The greater the expenditure of animal power, or the greater the activity of the vital functions, the more urgent and frequent does this demand for alimentary matter become. It is owing to this, that where there is a community of misfortune and many individuals are exposed to the horrors of famine, those who are young and vigorous are the first to perish. In old age, the various secretions and excretions are comparatively in a state of inactivity ;—there is not that incessant demand on the economy which exists in youth, and, consequently, aged persons can support privation and abstinence longer than those who have not reached the meridian of life. On the same principle females are, *cæteris paribus*, capable of sustaining abstinence better than males.¹

The symptoms which attend on protracted abstinence are thus described.² In the first instance, pain is felt in the epigastrium, which is relieved by pressure. The countenance becomes pale and cadaverous,—the eyes become wild and glistening,—the breath hot,—the mouth dry and parched. A most intolerable thirst supervenes, which, in all cases of attempted suicide by starvation, has formed the most

¹ FODERÉ, Méd. Lég. Vol. II. p. 279.

² ROSTAN. Elémens d'Hygiène. Art. Bromatologie.

prominent symptom, and it has required considerable resolution on the part of the sufferer to resist the desire for liquids. The body becomes emaciated, the eyes and cheeks sink, and the prominences of the bones are perceptible: the feelings of pain are often so intense as to give rise to fits of delirium. There is the most complete prostration of strength, which renders the individual incapable of the least exertion. After a longer or shorter period, the body exhales a fetid odour, the mucous membrane of the outlets becomes sometimes red and inflamed, and life is commonly terminated in a fit of maniacal delirium or in the most horrible convulsions.

The *period* which it requires for an individual to perish from hunger is subject to variation. It will depend materially upon the fact of whether a person has it in his power or not, to take occasionally a portion of liquid to relieve the overpowering thirst which is commonly experienced. The smallest portion of liquid thus taken is found to be capable of prolonging life, and it is even asserted that a very humid atmosphere, by preventing a too abundant cutaneous exhalation, will protract the period at which death from inanition ordinarily takes place.¹ The influence of liquid in supporting the life of animals under the privation of food, has been clearly demonstrated by the experiments of Redi, an Italian physiologist. He found that capons when entirely deprived of solids and liquids could not survive the ninth day. One of them was allowed to have access to water; it continued to take this liquid freely at intervals for a period of sixteen days, and it did not perish until the twentieth day. Dogs treated in the same way did not die until the thirty-fourth or thirty-sixth day.² The following cases will shew how great an abstinence from solid food may be supported by human beings provided liquids be occasionally furnished.

Engeltje Van der Vlies, a native of Holland, had professed that she could support the privation of food for a considerable length of time without inconvenience. A medical commission

¹ FODERÉ. Op. cit. loc. cit.

² REDI. Osservazioni intorno agli Animali viventi.

was appointed at the Hague, in the year 1826, to determine how far the statements circulated respecting this woman, were founded in fact. According to the report of the committee, this female, who was about thirty-nine years of age, remained for a period of twenty-eight days without taking any solid food. During the time of her probation, she appeared to suffer chiefly from restlessness, want of sleep, and other symptoms of constitutional disturbance. From the evidence of those appointed to watch her, it seems that she rinsed her mouth ten times during that period, to relieve the intolerable thirst which she occasionally suffered. She also frequently put her feet into warm water. Her bodily powers did not appear to suffer much from this protracted abstinence, for she frequently engaged herself in her usual occupations of knitting and sewing.¹

The commission of *suicide* by voluntary starvation, is somewhat rare, and from the very horrible sufferings known to have been experienced by those whom famine has driven, during sieges or in shipwreck, to feed upon the bodies of their fellow creatures, we may conclude that such an act must require greater self-resolution and a more obstinate determination of purpose, than are to be met with in the ordinary race of beings. Nevertheless some examples of such attempts are on record, and, from the history of these cases we chiefly derive our knowledge of the phenomena which are consequent on fatal abstinence in man.

Some years since, an individual of the name of Viterbi was condemned to death for murder, and previously to the execution of the sentence, was confined in the prison of Bastia, in Corsica. To avoid being put to death by the executioner, he resolved to starve himself. During the three first days, he suffered much from excessive hunger, but he could not be persuaded to take any kind of food which was brought to him, although wine and soup were taken daily to his cell and placed within his reach. Up to the sixth day, he had suffered little, but, at that period, he felt himself obliged to moisten his mouth and to gargle his throat to relieve the extreme

¹ Medical and Surgical Journal. Vol. VI. p. 53⁴.

thirst under which he was labouring. The thirst continued to increase up to the tenth day, and overcome by the excess of pain, he hastily seized a jug of water which was standing near him and swallowed the contents. His bodily powers now sank,—he became weak and languid, and by the seventeenth day he was incapable of making any exertion: his pulse was at this time scarcely perceptible,—his voice scarcely audible, and the surface of his body cold. The pangs of hunger and thirst returned, but no attempts on the part of his keepers, could shake the resolution which he had taken. On the nineteenth day he complained of a pain in the region of the heart and of a ringing in the ears, and on the *twenty-first* day he expired.¹

In April, 1831, a case of suicide by voluntary starvation occurred in the South of France, a report of which was read before the Academy of Medicine, in Paris.

Guillaume Granet, the subject of this case, was a prisoner at Toulouse, and his motive for adopting the resolution of starving himself, was to avoid punishment. For the first seven days, the symptoms under which he laboured were not very remarkable; his face was flushed, his breath foul, and his pulse small and feeble. After this period, he was compelled to drink water occasionally, to relieve the excessive thirst which he suffered,—but in spite of the close watching which was kept over him, he frequently drank his urine or the water of the prison-kennel. His strength did not appear to fail him during the greater part of the time, and with varying symptoms of constitutional disturbance and acute sufferings, he lingered till the *fifty-eighth* day, when he expired, after struggling for four hours, in convulsions.²

This is the most remarkable case on record of the protraction of existence under the privation of food. We do not however learn from this or any of the other cases, how long a period of perfect abstinence is required in order to prove fatal. In all of them, liquids were taken, the resolution

¹ Medical and Physical Journal. 1822—also PARIS and FONBLANQUE, Med. Jur. Vol. II. p. 69.

² London Medical Gazette. Vol. VIII. p. 730.

of these unfortunate persons not being sufficiently strong to withstand the intolerable thirst which manifested itself. It is probable that in a healthy subject under perfect abstinence, death would not commonly take place in a shorter period than a week or ten days.¹ This opinion appears to derive support from the results of those cases in which there has been abstinence from disease about the organs of deglutition.

Post-mortem appearances.—There are no very satisfactory details of the appearances presented by the bodies of those who have died of inanition: and the cases themselves are too rare to enable us to decide with certainty upon the accuracy of the reports which have hitherto appeared on the subject. According to Foderé,—the body is much emaciated, and although recent, exhales a fetid odour,—the skin dry,—the eyes are red and open,—the mouth and fauces parched,—and the stomach and intestines contracted and empty. The gall bladder is distended with bile,—the lungs, heart, and great vessels connected with these organs, are collapsed and destitute of blood. It is also stated that putrefaction takes place very speedily in such subjects.²

From this account of the changes produced in death from hunger, even admitting that they should all be present, the medical jurist may perceive that in forming his opinion in a doubtful case,—as on the discovery of a dead body whose previous history is unknown,—pathology can scarcely render him any assistance. The only appearance which requires to be noticed, is the empty state of the intestinal canal; but this condition of the canal is not so uncommon in death from other causes; and it is not impossible that in some instances, death may occur from abstinence before the canal is perfectly emptied. The emaciation of the body is also of itself insufficient to establish the fact. Cases of

¹ Among the rare cases of suicide by voluntary starvation may be mentioned, that of our King Richard II. This unfortunate Monarch was confined as a prisoner in the castle of Pomfret, and according to the accounts left us by Thomas of Walsingham and the Monk of Evesham, he refused all food in a fit of despair and died from starvation.

² FODERÉ, Vol. II. p. 276.

supposed death from starvation, rarely go beyond the Coroner's Court,—a statement is often hastily made to the effect that the deceased had died from want of food, the verdict is framed upon this statement, and the inquiry is thus set at rest. On such occasions commonly, the medical witness decides, rather from circumstantial than from pathological evidence,—so that if the grounds of his opinion were rigorously examined before a higher tribunal on a question of murder, by an acute counsel in cross-examination, where the proof of death by starvation rested on medical evidence alone, the witness would assuredly find himself much embarrassed to justify or defend it.

The duty of a medical jurist in these, as in all other cases, wherein his science affords him no positive data to determine the real cause of death, appears to me to consist: I. In determining that there has been no other probable cause of death. II. Where the general evidence bears out the presumption of death from starvation, in stating how far the pathological condition of the body coincides with this presumption. III. In not giving an opinion merely from the appearances of the body, if the general evidence should not support the presumption of death from starvation.

A case in which the value of the so-called signs of death by starvation came to be a subject of legal discussion, is reported in a work to which I have had frequent occasion to refer.¹ In 1768,—a girl aged fifteen, daughter of a Notary, at Nevers, in France, died under circumstances which led to the suspicion that her parents had starved her to death. It was proved in evidence that the girl had been ill-treated, but it rested with the medical witnesses to state from the post-mortem examination of the body, whether the deceased had really perished from want of food. They found that the stomach and alimentary canal as well as the other viscera of the chest and abdomen, with the exception of the right lung, were perfectly healthy. The stomach contained a small quantity of green-coloured bile: the small intestines were

¹ FODERÉ. Vol. III. p. 233. et. seq.

empty, but slightly inflamed, and the gall-bladder was distended with bile. The body was emaciated. The medical examiners declared that the deceased had died in a state of extreme debility, but they gave no opinion as to the origin of this debility. Notwithstanding this declaration, public prejudice went against the accused parties, and the celebrated Petit was ultimately required to decide from the medical report, whether or not the deceased had been starved.

Petit in refusing to assign any cause for death, decided that the emaciated state of the body,—the emptiness of the alimentary canal and the distension of the gall-bladder, were appearances which could not be relied on as proving positively that death had taken place from starvation. The other changes recorded in the report, do not require to be commented on, as they were casual and wholly unconnected with the question at issue. In consequence of this decision of Petit's, the capital charge against the parents was abandoned, but they were sentenced to the galleys for mal-treatment of the child.

Foderé condemns the decision of Petit in this case, and in his censures he is followed by Dr. Beck,¹ but, in my opinion, so far from shewing himself a partial investigator of truth as he is accused of being, this distinguished surgeon discharged the difficult duty that devolved on him in a manner which ought to serve as an example to all future witnesses. The statement of Foderé's objections, will suffice to shew clearly the justice of the decision.² This medical jurist contends that if the alimentary canal be found empty, and there be no apparent disease in the viscera, the presumption is that starvation is the cause of the emptiness, and the inference that the person has died from this cause.³ Again Foderé says, the viscera of the deceased in the above case were in a

¹ Elements of Med. Jur. p. 318.

² FODERÉ. Vol. III. p. 232.

³ It is obvious that the privation of food is the cause of the emptiness of the alimentary canal, but this is not the question. The point to be determined in such a case, is, whether the privation of food has or has not been carried to such an extent as to cause death. The mere emptiness of the alimentary canal can afford no proof of the fact.

healthy state, which he observes is uniformly the case in the bodies of those who perish from hunger. Lastly, the inflammation observed on the duodenum, he ascribes to the acidity of the bile from its not being renewed, the gall bladder being distended and resting on this organ. Any comment upon these objections to Petit's decision is unnecessary,—they appear to me, regarding them in a pathological point of view, to carry with them their own refutation.

On examining a body in which *homicide* is alleged to have been committed by starvation, it will be necessary for the practitioner to ascertain whether there may not have existed during life, a mechanical obstruction from disease. Rostan mentions the case of a female whom he attended in the hospital of Salpêtrière, whose œsophagus underwent a gradual obliteration from the pressure of some enlarged cervical glands. He states that it was impossible, for nearly two months previous to the death of this woman, to introduce the smallest portion of solid or liquid aliment. The sensation of thirst was most oppressive in her case. She was supported during the above-mentioned time by the use of baths and nutritious injections. She finally died, a victim to starvation.¹ Morgagni dissected the body of a woman who died under somewhat similar circumstances. This female during life experienced a sense of suffocation on every occasion that she attempted to swallow, so that previously to her death, she was compelled to abandon all attempts at taking food either in the solid or liquid state. She lingered six days, became much emaciated, and died in convulsions. It was found, on inspection, that there was a considerable aneurism which had pressed upon and almost completely obliterated the upper part of the œsophagus.² It is not uncommon in surgical practice to meet with cases where stricture of the œsophagus proves fatal owing to the impossibility on the part of the patient, of taking food. These facts are here mentioned in order that the attention of the practitioner may not be diverted from the existence of possible causes of starvation from disease.

¹ *Elémens d'Hygiène*. Vol. I. p. 287.

² *De Sedibus et Causis Morborum*. Ep. XVII.

The withholding of food from an infant, forms a case of homicide by starvation, on which a medical opinion may be occasionally required. If the crime be committed on an infant recently born, it may constitute infanticide by omission. It has been recently held by Mr. Baron Gurney, that the *mother* and not the father is bound to supply sustenance to an infant. The child in this case was aged ten weeks, and the father was charged with wilful murder, on the ground that he had not supplied it with food. The grand jury ignored the bill under the instructions of the judge upon the ground above stated.¹ But where the husband and wife were charged with the murder of an apprentice to the husband, by using him in a barbarous manner, and the opinion of the medical witness was, that the boy died from debility occasioned by the want of proper nourishment, it was held that the wife was entitled to be acquitted, as it was the duty of the *husband* and not of the wife to provide sufficient food and nourishment for the apprentice.²

Starvation is rare as an act of homicide, but it must not be supposed that the law implies by this, the absolute privation of food; for if that which is furnished to a person be insufficient in quantity or of improper quality, and death be a consequence, malice being at the same time proved, then the offender equally subjects himself to a charge of murder. Not many years since, a woman who was accustomed to take parish apprentices, was tried and convicted for the murder of two children, who died in consequence of the bad quality and small quantity of food furnished to them by the prisoner.

FIRE.

My object, in this division of the chapter, is to lay before the reader a few medico-legal questions, which are connected with the destruction of life by fire, or by severe and mortal burns, whether of accidental or of criminal origin.

The most important point to determine on these occasions,

¹ Davey's case. Exeter Assizes. March, 1835.

² Rex v. Squire and Ux. RUSSEL 621. STARKIE, Vol. II. p. 947.

is whether the burning occurred before or after death. In the first place, it may be the object of a murderer to conceal his crime by burning the body,—this it will be remembered was the way in which the prisoner Cook attempted, a few years since, to dispose of the body of a Mr. Paas whom he had murdered. The body of the deceased was cut up into small pieces and gradually burnt, but sufficient was discovered to make out the identity. Again, a murder may be committed, and the guilty person may subsequently set fire to the body, and ground his defence on the plea that the deceased was accidentally burnt to death. Foderé mentions a case which shews that we should not form an opinion too hastily from external appearances. In the year 1809, at a village near Marseilles, several persons were murdered, and the house in which they were living was set fire to. The bodies were found burnt, and it was presumed that they had perished accidentally in the fire. In consequence of some suspicion arising, the remains of the deceased were disinterred thirteen days after the burial, and it was then seen on careful examination, that the burns were of a very superficial nature, and that deeply penetrating wounds, evidently inflicted by an axe, existed on various parts of the bodies. These wounds were the cause of death, but they had been overlooked in the first instance.¹

Two cases have been recently reported by Dr. Christison which bear directly upon this part of our subject.²

The first is that of a man of the name of Gilchrist, who was tried at Glasgow for the murder of his wife.

The prisoner and the deceased, according to the evidence, led a somewhat rambling dissipated life. On the evening of the alleged murder, the persons who lived on the floor above them, stated that they heard a noise like that of two persons struggling, and afterwards a moaning as of one choking or bleeding to death. A smell of fire now became perceptible in the house, which was soon filled with smoke. The witnesses being alarmed, went down to the prisoner's apartment and demanded admission. After some delay he ad-

¹ Vol. III. p. 18.

² Medical Gazette, Vol. VIII. p. 107.

mitted them, and in doing so, appeared to them to have come out of an inner room where he said he had been sleeping. On letting them in, he stumbled over the body of his wife who lay in the outer apartment quite dead, kneeling before a chair and very much burnt. The prisoner was accused of having murdered her and then burnt the body to conceal the manner of death.

In his defence, he alleged that he had gone to bed tired, and that he knew nothing of what had happened to his wife until awoke by his neighbours. He presumed that her clothes had caught fire while she was intoxicated, and that she was thus accidentally burnt.

The medical witnesses who examined the body, reported that they found it so much burnt that they could give no opinion as to the cause of death. The prisoner was condemned and executed, the general evidence being against him, although the precise manner of his wife's death, as Dr. Duncan observes, was not proved even presumptively.

In the second case which occurred at Leith, Dr. Duncan himself was the chief medical witness. The general evidence was similar to that adduced in the case of Gilchrist, but stronger against the prisoner. It appears that he and his wife lived on bad terms. On the night of the alleged murder, the prisoner was in bed, when his wife returned home with a lighted candle and some whiskey which she had procured at a neighbour's. Some time afterwards, a struggling was heard in the apartment and after this had subsided, a smell of fire was perceived to issue from it. The neighbours now endeavoured, to obtain admission by knocking at the prisoner's door, but he either could not or would not hear them. At last a man forced his way in, by breaking the window of the outer room. On entering, he found the room full of smoke and something burning in a corner, over which he instantly threw a pitcher of water:—this proved to be the body of the deceased. Several persons now entered the inner room, where they found the prisoner either asleep or feigning to be so. On being roused and told that his wife was dead, he expressed neither surprise nor sorrow; but coolly demanded by what authority his neighbours had broken into his house

and threatened to send for a constable to commit them. On an examination of the body, some parts were found completely carbonized by the action of the fire. On the face and extremities, however, the fire had not acted with such violence, and on these parts were found marks of vital reaction indicating that the burning had taken place during life. Some spots were merely red and inflamed, others scorched to a hard transparent crust but surrounded by a distinct redness: there were also many vesications filled with lymph. From these appearances, the witnesses gave it as their opinion that the deceased had been burnt to death. The Jury in this case returned a verdict of *not proven*, considering probably that the deceased might have been accidentally burnt.

Dr. Duncan remarks, in regard to these two cases, that the action of the fire was extremely violent and destructive compared with the small quantity of combustible matter consumed. In both, the burns must have been produced by the ignition of the clothes alone, since there was no trace of burning of the house or furniture in either. In the second case, the deceased was found on the hearth with part of her clothes unburnt, and a chair from which she had fallen, quite entire. She was dead when the neighbours entered; and the body was discovered in the dark by the red light issuing from it.

An important question was raised on the second trial, in reference to the opinion of the deceased having been burnt to death, namely, whether the redness and blisters, remarked on the edges of the scorched parts, might not have arisen immediately after strangling or some other cause of death than burning, during the period when a lingering vitality remains in the body, and when undoubtedly certain phenomena of a vital nature, are frequently observed. The medical witnesses felt themselves unable to answer the question decisively, but they stated that they did not consider it at all probable that blisters could be produced on the body even immediately after death. It was the uncertainty in which this important medico-legal question was left, that led Dr. Christison to experiment on the subject: the results which he obtained are embodied in the following remarks.

I. *Appearances assumed by burns inflicted during life.*

The immediate effect of a severe burn is to cause a diffused redness of the skin around the burnt part, removable by gentle pressure, and not permanent after death. Next to this in order, and occurring about the same time, is a narrow line of deep redness, separated from the burnt part by a stripe of dead whiteness, abruptly terminated and passing at its outer edge by insensible degrees into the diffused redness already described; this deep redness is not, however, capable of being removed by moderate pressure. These appearances are well seen on the application of the actual cautery. According to Christison, they are to be observed in a very few seconds, sometimes in five, generally within fifteen, and once he observed them so late as thirty seconds after the burn. Within this short space of time, the inner edge of the redness surrounding the cauterized part became of a deep crimson colour which could not be removed by pressure. The next appearance in point of order, is blistering. The Doctor states, that he has not been able to determine the usual period at which blisters are formed: he considers them, however, an uncertain consequence of a burn if life be extinguished a few minutes afterwards. When the burn is produced by a scalding fluid, vesications generally appear in a very few minutes;—yet in young children there are sometimes no vesications for several hours. Even on the application of incaudescant bodies to the skin, vesication is not an invariable consequence; but it has been in some instances observed on the body, where death has speedily followed the injury. These blisters when they exist as a vital consequence of the burn, are filled with *serum*.

II. *Appearances assumed by burns inflicted after death.*

This subject cannot be better elucidated than by giving a brief outline of Christison's experiments. 1. In a stout young man, who poisoned himself by taking laudanum, a very hot poker and a stream of boiling water were applied to the skin of the chest and inside of the arm *one hour* after death. The next day, no redness or blisters were visible on or near the burns. At the parts burnt with scalding water,

the cuticle appeared as if ruffled, and it could be very easily rubbed off: but there was not a trace of moisture on the true skin beneath. Where the poker had been used, the whole thickness of the skin was dried up, being of a brownish colour and translucent, but entirely free from redness or blistering.

2. A stout young woman died after ten or twelve days illness of low typhoid fever. *Ten minutes* after death, boiling water was poured in a continued stream on the breast and the outside of one of the legs. The body was examined within thirty-six hours. On the leg no trace whatever of the action of heat could be discovered. The breast was of a very pale brownish hue, the cuticle slightly shrivelled, dry, brittle, and easily scratched off. The surface of the true skin below was dry, and around the burnt part, there was not a vestige of redness or blistering. In this instance, the heat was applied so soon after death, that the gentleman who applied it, felt convinced that he observed the chest heave up when the hot water was poured on.

3. A very powerful athletic young man poisoned himself with laudanum, and although the stomach-pump was employed not many hours after he had swallowed the poison, he continued perfectly comatose, and without exhibiting any sign of sensibility on the application of the ordinary stimulants. Four hours before death, a tin vessel filled with boiling water, was closely applied on several parts of the arms, and a hot smoothing-iron was held on the outside of the hip-joint. *Half an hour* after death, a red-hot poker was applied to three places on the inside of the arm. The body was examined in thirty-eight hours. Some of the spots burnt during life, presented a uniform blister filled with serum:—on two, there was no blister, but the cuticle was gone and the true skin dried into a reddish translucent membrane, at the edge of which there were drops of serum, with portions of the same fluid dried by evaporation. Around all these spots, there was more or less scarlet redness, particularly around the two spots last mentioned. A bright red border half an inch wide, surrounded the whole of the burns, and the redness was not in the slightest degree dimi-

nished by firm pressure. Some of the spots produced by the burns after death were charred on the surface but not elevated:—two presented vesications, but the blisters were filled with *air*:—the cuticle over them was dry and cracked, and the surface of the cutis beneath was also quite dry. On the white parts of the skin, there was no adjacent redness: but the lividity commonly observed on the dead body, surrounded the edges of two of the burns. Moderate pressure applied for a minute, sufficed to remove this appearance.

4. A cauterizing iron was applied to a leg *half an hour* after amputation. Around the cauterized part, whiteness and dryness of the skin were observed, but no redness or vesication.

A cauterizing iron was next applied to a leg *ten minutes* after its removal from the body. The effects were the same as those just described, except that in this case, blisters were formed around the burn: these blisters, however, were dry and filled with *air*.

So far as these experiments go, we cannot but agree with the learned experimentalist, that the existence of a line of redness near the burn not removable by pressure, and likewise the formation of blisters filled with *serum*, are signs of a burn having been inflicted during life,—as also that when ten minutes have been suffered to elapse after death from any other cause, the vital consequences of burns can no longer be produced on the body, so that the attempt of a murderer to imitate death from accidental burning, must fail under such circumstances. In allowing the general correctness of these inferences we must not forget as impartial witnesses, that but few experiments have been made in this department of medical jurisprudence, and there are none among those above enumerated, which refute the possibility of the vital consequences of a burn being produced on the dead body, where the burning takes place *within ten minutes* after dissolution.

Human Combustion. The susceptibility of the human body to undergo what is termed spontaneous combustion, has been, of late years, a much disputed question among

pathologists and medical jurists. Some have altogether denied the existence of such a phenomenon, while others have admitted and implicitly believed the whole of the published cases, notwithstanding the very improbable details of many of these. To the medical jurist, the settlement of this question is important, since, supposing the doctrine to be founded on fact, a man might be condemned for murder by burning the deceased, when the whole of the facts might probably be explained by a reference to the alleged spontaneous combustion of the body. In the following case, this judicial question was raised, and led to the acquittal of the prisoner. It rests on the authority of Le Cat, who was a firm believer in the doctrine:—it is said to have taken place in the year 1725.

A man of the name of Millet, living at Rheims, was charged with the murder of his wife. It appears that the body of the deceased was found lying in the kitchen of the house at a short distance from the hearth entirely consumed. A part of the head only, with a portion of the lower extremities, and a few of the vertebræ had escaped combustion. The floor beneath the body was partially burnt. The prisoner in his defence, stated that he and his wife had retired to rest the evening previously,—that his wife not being able to sleep, got up and went into the kitchen, as he supposed, to warm herself. He was awakened by the smell of fire, and going down into the kitchen, discovered the deceased lying near the hearth in the manner stated. The prisoner was condemned to death for the murder, but on appeal to a higher court, the sentence was revoked, and it was pronounced to have been a case of human combustion.

There is nothing in the evidence on this trial, which at all bears out the views of those who advocate the doctrine of *spontaneous* combustion. The whole of the facts appear reconcilable on the supposition that the deceased was burnt to death, probably by the accidental ignition of her clothes.

According to Orfila, the following are the phenomena which accompany the spontaneous combustion of the human body. A light blue flame appears over the part which is about to be attacked: this flame does not become readily extinguished by water, and indeed frequently the addition of

this liquid only serves to increase its activity. Deep eschars now form in the part affected, accompanied by convulsions, delirium, vomiting, and diarrhœa, followed by a peculiar state of putrefaction, and death. The process is said to advance with extreme rapidity, but the body is never entirely consumed: some parts are only half burnt while others are completely incinerated, a carbonaceous, fetid, unctuous ash remaining. The hands and feet commonly escape destruction, while the trunk is usually entirely dissipated. The wooden and other combustible articles of furniture situated near the individual, are either uninjured or but imperfectly consumed, the clothes, however, covering the body are commonly destroyed. The walls and furniture of the apartment are covered with a thick greasy soot, and the air is impregnated with an offensive empyreumatic odour.¹

This phenomenon is stated to have been chiefly observed in corpulent females, advanced in life, and especially in those subjects who had been long addicted to the abuse of spirituous liquors.

The number of recorded cases of human or spontaneous combustion are few,—most of them are stated to have occurred many years since; and notwithstanding the much greater abuse of spirituous liquors which now exists, the pretended phenomenon is not heard of. The greater number of the cases are described to have occurred on the continent, and the reporters rarely appear to have been the witnesses of the alleged phenomena. These considerations, coupled with the generally extreme improbability of the details, might appear sufficient to justify modern writers in repudiating the doctrine as absurd and unfounded: but when we consider that many learned and intelligent men have treated of it as a possible event, and further, that the incidents of these cases, wherever they are stated to have occurred, have been uniformly similar, we are at least bound to give to it our calm consideration. An unwarrantable scepticism is as dangerous to the progress of science, as the most unreserved credulity. They, who have rejected this doctrine of human combustion,

¹ ORFILA. Vol. II. p. 562.

without examination, have been led to do this chiefly from the inexplicability of the alleged facts; but it should be remembered, that we have long since passed that era in philosophy, in which the power of explaining a natural event is deemed the preliminary test to its admission among scientific truths.

The authenticity of many of the cases is, I think, fairly open to dispute: but the following which is represented to have occurred in this country in the year 1744, and the details of which are reported in the *Philosophical Transactions*, has been deemed worthy of credit.¹

Grace Pett, the wife of a fisherman, of Ipswich, aged about sixty, was in the habit of smoking her pipe every night by the fire, previously to retiring to rest. She did this on the evening of her death. Her daughter, who lay in the same bed with her, had fallen asleep, and did not miss her mother until she awoke early in the morning. Upon dressing herself and going down stairs, she found her mother's body lying on the right side with her head against the grate, and extended over the hearth with her legs on the deal floor: it appeared like a block of wood burning in a glowing fire without flame. The girl attempted to quench the fire by water, but this produced a most suffocating smell. The trunk of the unfortunate woman was found to be almost burnt to ashes, presenting the appearance of a heap of coals covered by a white ash: the head, arms, legs, and thighs were also much burnt. There was no fire whatever in the grate, and the candle was consumed to the socket of the candlestick which stood by her. The clothes of a child on one side of her, and a paper screen on the other, were untouched; the deal floor was neither singed nor discoloured. It was said that the woman had drunk plentifully of gin overnight, in welcoming a daughter, who had recently returned from Gibraltar.²

The cases quoted by Lair, Foderé, and others, are very similar to this in their details. Leaving these, we will proceed

¹ Vol. XLIII.

² This case is quoted by Sir David Brewster. *Letters on Natural Magic*, p. 325.

to examine the hypotheses which have been offered to explain this very singular mode of the destruction of life. Two questions of a very different nature appear to me to have been frequently but improperly united in these explanations. In the first place, some allege that the combustion may take place from internal causes,—in other words, that the process is literally *spontaneous*. Others contend that the contact of a substance in a state of ignition, is necessary for the production of the phenomenon,—so that according to this view, the human body merely becomes preternaturally combustible. The hypothesis of those who advocate *spontaneous* combustion is, I conceive, perfectly untenable. So far as I have been enabled to examine this subject there is not a single well authenticated instance of such an event occurring:—in the cases reported which are worthy of any credit, a candle or some other ignited body has been at hand, and the accidental ignition of the clothes was highly probable if not absolutely certain. It is in vain that they who contend for this hypothesis, appeal to the electrical state of the atmosphere or of the individual, coupled with the impregnation of the system by the inflammable principles of alcohol, as conditions sufficiently explanatory of their views,—such explanations may be reserved until the occurrence of this spontaneous combustion from internal causes, is placed beyond all dispute. We will now then consider, how far the views of those who allow that the body may acquire preternaturally combustible properties, are consistently borne out by facts. It is generally admitted that the human body is highly difficult of combustion, and therefore, if in any case, the degree to which it is consumed by fire is great in proportion to the small quantity of combustible matter destroyed about the person, it is not unreasonable to refer this to its possessing greater combustible properties. This is precisely the species of evidence which is furnished by the alleged cases of spontaneous combustion: the body has been found almost entirely consumed, and the clothes and other articles of furniture surrounding it, but little injured. A similar remark was made by Dr. Duncan respecting the two cases

just now related, in which the husbands were tried for the murder of their wives: in both it was the opinion of this physician that the bodies of the deceased were preternaturally combustible.

The following case which recently appeared in a foreign journal, is considered by the reporter to present an instance of that morbid change in the body of which we are now treating. A few years since, a patient who had been labouring under a severe illness, the nature of which is not distinctly specified, was admitted into the Hotel Dieu of Paris, where he died. M. Bally, under whose care the man had been placed, proceeded to examine the body eight hours after death. There was a vesicular eruption on the skin, the vesicles being distended by a reddish coloured serum mixed with gas, and some of these vesicles contained nothing but gas. The skin of the extremities was puffy, and the abdomen much distended: when incisions were made in the puffy places, there issued forth a gas which ignited and burnt on the approach of a lighted taper. An aperture was then made into the abdomen and a taper applied,—a beautiful tuft of flame was immediately formed, the base of which was blue and the apex white, like that of bicarburetted hydrogen: the border of the incised part became at the same time incinerated. The gas existing in the intestines, is stated by the reporter, to have had no inflammable properties whatever. The deceased had not been addicted to the abuse of spirituous liquors.

The facts of this case scarcely appear to warrant the inference which is attempted to be drawn from them. It is not at all improbable that the inflammable gas originated from an incipient process of putrefaction: at any rate, its existence in the abdomen or vesicles, does not prove that the solid structures of the body were in a state which rendered them prone to combustion.

Without attempting to offer any explanation of the fact, I think there is sufficiently satisfactory evidence on record, to bear us out in admitting that the human body may, under certain circumstances, acquire increased combustible properties. At the same time, the medical jurist will

perceive that this admission does not involve any difficulty in the judicial determination of a question of murder by burning, since it is contended that the combustion of the body cannot take place, except by contact with ignited substances. But whether the ignition of the clothes of a deceased person took place accidentally, or by the criminal act of an accused party, is a totally different question, it is one in which the medical jurist is no more concerned than a non-professional witness,—this is in fact a point which can only be cleared up by general or circumstantial evidence.

Spontaneous Combustion. Although it is denied that there is any proof of such a phenomenon as the spontaneous combustion of the living body, it must be admitted that by a re-action in the particles of organic or inorganic matter, combustion may take place independently of the approach or contact of an ignited substance. We are not now speaking of those effects that result from the admixture of bodies by chemists, with which every one, who has devoted but a slight attention to chemical manipulation, must be familiar,—but of certain other phenomena which, although assuredly dependant on, and explicable by the same laws, are far less commonly understood, and have only lately received any attention from the scientific inquirer. Let us suppose a case ;—In a floor-cloth manufactory,—in a granary, or store-house, a fire may suddenly break out and spread through the whole building with destructive energy,—it is pronounced to be the act of an incendiary,—a person known to have harboured ill-feelings against the proprietors is seen coming from the spot just before the occurrence of the fire,—some careless expressions and a few apparently strong points of circumstantial evidence are adduced against him, he is tried, condemned, and executed. It is here then, that a medical jurist is called upon to step forward and employ his science, not to protect a criminal, but to see that a human life is not sacrificed on a groundless charge. Should any individual be consulted on such occasions, it will undoubtedly be the medical practitioner, and the examination of this subject, therefore, must form a part of his duties : a slight reflection

will teach him, that there is no member of society who ought to be so competent as himself to solve the questions which may arise. We have yet much to learn respecting the causes of this spontaneous combustion of bodies, for hitherto only a few insulated facts have been collected, some of which, however, are so striking and unprecedented, as to lead to the presumption that there exist many substances capable of presenting this singular phenomenon, which are now unsuspected.

Towards the latter part of the last century, several fires occurred in the Russian Navy, as well as in the warehouses on shore, which were at first attributed to incendiarism, but which were subsequently discovered to be owing to the spontaneous inflammation of masses of *hemp* and *flax* impregnated with oil. Experiments were made on the subject by the Imperial Academy of Sciences, and it was shewn to the satisfaction of the Russian Admiralty, that such materials when heaped together and allowed to remain for some time with a full access of air, would spontaneously ignite.¹

Cotton impregnated with oil will also undergo spontaneous combustion. An accident of this kind occurred at New York in 1832, by which a ship and her cargo were nearly destroyed, owing to the spontaneous ignition of some bales of cotton on which oil had become spilled. But cotton of itself is capable of igniting when packed too early and before it is thoroughly dry. It was to this that the destruction of the *Earl of Eldon*, in September 1834, was owing. The captain of the ship informed me that the cotton which he had on board, had been brought down to Bombay during the wet season,—that no attempt was made to dry it properly before shipping it, and that in this state, it was closely packed between decks, as well as in every spare part of the vessel. About a month after leaving the port, the crew were alarmed by an abundance of vapour issuing from the fore-hatchways. The vapour became more dense and assumed the character of a thick smoke. Several

¹ PARIS and FONBLANQUE. Vol. I, p. 410.

bales of cotton were removed, but the danger became thereby increased, owing to the free current of air created, and in a very few hours the deck caught fire. The ship was then abandoned and its total destruction speedily followed.

It is well known that in the stacking of hay, if the grass is cut and stacked too early, combustion will almost inevitably follow,—this seems to be a parallel phenomenon with that just described.

Another substance exposed to this singular condition is charcoal, especially in that form of it called *Lamp-black*. A friend has furnished me with the following particulars of a case of this nature. A few years since, a ship laden with some lamp-black, in casks, sailed from Portsmouth for Calcutta. About six weeks after their departure a strong smell of burning was perceived to issue from the fore-hold, accompanied by smoke. On examination, it was found that a large cask of lamp-black was giving out volumes of smoke although not actually in flames. It was with some difficulty, owing to the intense heat of the cask, that it could be got on deck and thrown overboard; in this case, it was presumed that the admission of air to the interior of the cask would have caused its instant ignition. In consequence of this discovery the whole of the lamp-black on board, to the number of sixty-one casks, was thrown into the sea, and several of them were observed to be in a state of smothered combustion: the casks were surrounded by a number of barrels of tar, and jars of oil, but it did not transpire whether any of these inflammable substances had become mixed with the contents. No light had been allowed in the hold since leaving England,—it was therefore a clear instance of spontaneous combustion.

The cause of this phenomenon in charcoal is not well understood. The following facts we derive from the experiments of M. Aubert, a French engineer.¹ When recently-made charcoal is reduced to a very fine state of division, it rapidly absorbs air and aqueous vapour, especially the former. The air undergoes no change up to the moment

¹ Annales de Chimie. 1831.

at which combustion ensues, but a considerable quantity of heat is extricated, which this experimentalist found at one time to be equal to 350° F. The greatest degree of heat was observed to be in the centre of the mass or about five or six inches below the surface, and it appears that here ignition first commences, if there is a tolerably free access of air. M. Aubert found that the most inflammable charcoal required to be in masses of at least sixty pounds, for inflammation to take place spontaneously, and the less inflammable the charcoal, the larger the quantity required to be collected in a heap. In all these cases the charcoal was pulverized, and the shorter the time suffered to elapse between its manufacture and its pulverization, the more certainly and rapidly did ignition take place. Air is not only necessary for the spontaneous inflammation of this substance, but there must be a free access of it to the surface of the mass.

For a knowledge of another body, largely existing in certain manufactures, possessing the property of spontaneously igniting, we are indebted to Mr. Scanlan.¹ In March 1835, a fire broke out in a turpentine distillery, at Dublin. The fire was confined to what is termed by turpentine-distillers *Chip-cake*, and it could only be attributed, under the circumstances, to the act of an incendiary or to the spontaneous ignition of this substance. The raw American turpentine as it is imported, contains many impurities in the form of chips of wood, leaves, and leaf-stalks. These impurities are commonly separated by heating the turpentine to about 180° and straining it,—the mass thus separated (which is subsequently exposed to a temperature of 212°) is called *chip-cake*: when thus obtained it has not been known to undergo spontaneous combustion. On the occasion above-mentioned, a new plan had been adopted by the manufacturer. The raw turpentine with its impurities was exposed at once to a temperature of about 250°, and the boiling rosin was then strained from the chips. The *chip-cake* resulting from this process was laid in a heap outside

¹ Records of General Science. August 1835.

the still-house, about three o'clock in the afternoon, and at midnight was observed to be in flames. Mr. Scanlan found, in making his observations upon a portion of chip-cake thus prepared, that the temperature gradually increased in the centre of the heap, although on the exterior, it was cold and brittle: in four hours, a thermometer rose to 400°, and a large quantity of vapour, accompanied by a strong odour of pitch and rosin, was extricated. The exposure of the mass experimented on, took place at one o'clock in the afternoon, and though it rained hard during the night, at half-past seven the following morning it burst into a flame. Three experiments were made and were attended by similar results,—in the third, the porous heap appeared to become red hot in the centre, so that the adhering rosin melted and dropped from beneath.

In the same paper, this gentleman mentions that a friend of his, who had placed a quantity of *red fire* in a store-room, was surprised by its spontaneously igniting and becoming entirely consumed the following day, while he was in an adjoining apartment. This powder is much used in theatres for the production of artificial light,—it is a mixture of nitrate of strontian, sulphur, sulphuret of antimony, chlorate of potash, and charcoal: this I believe is the only instance on record of its spontaneous combustion. Other facts might be quoted relative to the spontaneous ignition of substances, which are not commonly supposed to possess such a property; but I think enough has been said to induce the medical jurist to give his attention to this curious phenomenon, and on a charge of incendiarism, founded on mere presumption, to act as the defender of an accused party, should the facts of the case warrant the belief that the fire had originated from any of these secret operations of nature.

CHAPTER VI.

WOUNDS.

Caution in making an inspection of the body,—the whole of the body to be inspected,—examination of a wound,—when inflicted,—nature of the instrument used,—notes made on the spot,—differences among witnesses on matters of fact. Mortal and dangerous wounds,—among several wounds, the necessity of determining which is mortal,—the intent of a prisoner punished when murder is attempted,—whether the wound was inflicted during life or after death,—signs of a wound inflicted during life.—Hæmorrhage sometimes observed in wounds made after death,—sometimes not observed in wounds made during life,—characters of incised wounds made after death.—Ecchymosis on the living,—changes peculiar to it,—a source of circumstantial evidence,—contusions on the recently dead,—coagula of blood,—evidence regarding fractures,—Ecchymosis from infirmity or disease,—sugillation.—Cadaverous ecchymosis.—Vibices,—evidence in the case of Campbell,—of Carlo Ferrari.—Detection of wounds long after death.—Whether the wound was the cause of death or not,—causes of death not to be multiplied.—I. Death an immediate consequence of a wound,—dying declarations.—II. Death not an immediate consequence of a wound,—death from a wound after the lapse of twenty-five years,—different principles of the English and French Law.—III. Death may follow a wound but not be caused by it,—cases,—death from co-existing disease,—from a wound inflicted subsequently to another wound,—from poison after the receipt of a wound,—cases.

SOME writers, in introducing the subject of death from local injuries or wounds, have thought proper to lay down rules for performing what they term medico-legal dissection. It seems to me unnecessary to follow such a practice, for the medico-legal examination of a dead body does not differ from that which is instituted simply for pathological purposes; except that care and attention are more especially demanded on the part of a medical jurist. Under circumstances of suspicious death, he should remember that he makes an

inspection of the body, not merely for his own satisfaction, but for the instruction of those, in whose province it lies to inquire into the cause of death. Moreover the opinion which he forms from the appearances met with, may be afterwards closely sifted and accurately weighed by acute and intelligent men; and should there be any portion of this duty which he has neglected, his conduct will become subject to exposure and animadversion. These considerations then ought to make every surgeon cautious and circumspect.

In the examination of a dead body, where death is suspected to have been caused by a severe local injury, there is one point which should be especially attended to,—a want of attention to it has often seriously impeded the course of justice. The medical practitioner has frequently contented himself by confining his dissection to the injured part, thinking that on the trial of the accused party, the questions of counsel would be limited to the situation and extent of the wound only: but the past histories of trials teach us that a serious mistake has been here committed. If the cause of death from a local injury, be at all obscure, on no account should the inspection be abandoned until every organ and cavity of the body have been closely examined. Barristers are accustomed to lay so much stress upon negative evidence, when it makes in favour of their clients, that they look with satisfaction to the successful defence of a case, if they find that the examination of a dead body has been only partial. They will affirm that a natural cause of death might have existed in that organ or cavity, which the medical witness, through unsuspecting confidence in his own knowledge, neglected to examine. It rests with the practitioner to disprove the probability thus urged by counsel, but he is now destitute of facts to reason from: legal ingenuity will triumph, the witness will be discomfited, and the prisoner, of whose guilt there may be, morally speaking, but little doubt, will have the benefit of his inattention, and be acquitted by the jury. Let the following case, which occurred a few years since on the Home circuit, serve as an example

of the necessity for making a close inspection of the body, in death from wounds:

Three men were tried on a charge of manslaughter: the evidence brought against them was as follows. The prisoners and the deceased had been drinking together at a public house, when a quarrel arose, which ended in a battle between the deceased and one of the prisoners. The other two acted as seconds. The fight had continued for some time, when the deceased was knocked down by a severe blow on the head and did not speak afterwards. A surgeon was sent for, but before his arrival the deceased had expired. On the trial this witness stated, that he found a considerable bruise behind the ear in the region of the mastoid process, accompanied by the extravasation of blood. On being cross-examined, he admitted that he did not open the cranium, the coroner having told him that it was unnecessary. He ascribed the death of the deceased to a pressure of blood on the brain, which, in his opinion, might have become extravasated from a blow or fall, or from extraordinary excitement. The deceased was of an apoplectic diathesis.

The learned judge observed to the jury in summing up, that the medical evidence was not sufficient to determine whether the deceased had died from the violence employed by the prisoner, or from natural causes. An acquittal instantly followed!

It is scarcely necessary to adduce other cases to establish the importance of the principle of duty here advocated. The simple consequence of rigorously adhering to it, will be to give a little more trouble to the practitioner, which may occasionally prove unnecessary,—while on the other hand, the consequences of neglecting it may be to risk his professional reputation and expose him to severe reproof from the court.

In examining the wound, he should notice its precise situation, extent, and direction, making notes of his observations on the spot.¹ He should describe accurately the muscles, vessels, nerves, or bones which may be involved in

¹ Vide page 15.

it, or if it is situated over a cavity, whether any and what viscera have been injured. It will require but little trouble on the part of a man moderately versed in anatomy, to ascertain what muscles or parts of muscles are implicated in a wound, and the settlement of these points at a post-mortem inspection, will materially aid him in describing the wound at a future time, and in forming his judgment as to its dangerous or mortal nature. He must now endeavour to determine the probable time at which the wound was inflicted, by noticing the state of the divided parts, whether they be filled with extravasated blood or not, and if so, whether that blood be in a coagulated state or not: if there should be no blood in the course of the wound, whether the edges of the wound be at all enlarged, or bear any other signs indicative of the access of inflammation. If there be ecchymosis he should define its extent, and note whether the colours, peculiar to ecchymosis of long standing, be present or not. On trials for murder or manslaughter, it is not uncommon for counsel to ask the witness to state the probable nature of the instrument by which the wound was inflicted; his answer on such occasions may materially corroborate points of circumstantial evidence. No rules can be laid down for his guidance in this part of the inquiry,—his professional knowledge and experience must suffice to dictate to him the course which he ought to pursue. A wound may be incised, contused, lacerated, or punctured, according to the kind of instrument used, and sometimes according to the manner in which the instrument is employed.

It is always better in a question of life and death, as where an accusation of murder exists against a party, that the practitioner should obtain the assistance of some of his professional brethren in conducting the post-mortem examination. The law is very properly jealous of convicting a prisoner on evidence which presents the least room for doubt or ambiguity, and that such may arise when one medical witness takes upon himself the whole conduct of a case, is very possible. If his evidence is corroborated by that of others, it will place him in a much more advantageous

position as a witness, and his individual testimony will then have its full value in the prosecution or defence of the prisoner. Let us suppose that several are present at the examination, the duty of him who conducts it, is to allow his fellow-practitioners to satisfy themselves as he proceeds of the nature of the appearances displayed; and if he were inclined to profit by the experience of the past, he would, for his own sake, require every appearance to be recorded in writing on the spot, and see that the signatures of all present are attached to the paper at the conclusion of the inspection. If some such plan be not adopted, it is by no means improbable that on the trial, which might not take place until after the lapse of four or five months, there will be a considerable difference in the testimony of each person, arising perhaps in some cases from defective memory, and in others from a want of proper attention at the time. Such differences in the description of matters of fact, when they do occur, are but little creditable to the profession,—they are generally strongly animadverted on by the court, and are in almost all instances fatal to the case.

A trial took place in the West of England not very long since, in which a woman was indicted for inflicting a wound on the throat, which caused the death of the deceased. The chief medical witness stated in his evidence that it was the neck which was wounded and not the throat, upon which very absurd distinction in the specification of the wounded part, an objection was taken by the prisoner's counsel, on the ground that the wound had been mis-described in the indictment. This objection was speedily over-ruled by the court, but the prisoner was afterwards acquitted from the conflicting evidence given respecting the parts implicated in the wound. One witness deposed that the carotid artery on one side of the neck was divided, while another declared that that vessel was untouched!

On an inquest which lately took place, two surgeons referred the death of a man who had been severely beaten by certain parties, to the effects of drinking, stating that there was merely a cut on the deceased's nose, which could have no connection whatever with his death. Two others,

one of whom had made a post-mortem inspection of the body, deposed that they found the maxillary and nasal bones most extensively fractured. On opening the head, they found traces of inflammation of the brain to which they attributed the death of the deceased. In consequence of this conflicting evidence, a verdict of "died by the visitation of God" was returned.

I might multiply cases of this description, but the result of these two, will surely suffice to prove to the medical practitioner that too much care cannot be bestowed on the inspection: he will always be on the safe side if he take care to secure the assistance of others, and to see that they are satisfied as well as himself of the situation and extent of the injuries.

Let us now suppose that the witness is called upon to state whether the wound observed on a dead body, is of a *mortal* nature or not,—here again we have a question to be decided by the witnesses' professional knowledge. Death will sometimes take place from apparently slight wounds where any of the viscera or larger blood-vessels are involved. If the heart, brain, or lungs are penetrated, or any of the great veins or arteries laid open, the physiological importance of these parts in the maintenance of life, is so well known, that there would be little hesitation on the part of the witness, to pronounce such wounds mortal. His judgment may be modified by their extent, and sometimes by the circumstances accompanying their infliction, but their existence in the dead body, after he has acquired the certainty of their having been inflicted during life, will justify him in attributing to them, the death of the deceased. Nothing appears to me to be more absurd, than the attempt to lay down particular rules for the determination of the mortality of wounds. We occasionally hear of the most extraordinary escapes from injuries which scarcely a surgeon would have hesitated to pronounce necessarily mortal, while on the other hand individuals will die from the secondary consequences of wounds, which appeared in the first instance to be trivial. Nevertheless, as Dr. Beck observes, barristers are much disposed to push the question

relative to the mortality of wounds to a very great extent. This of course is done as a fair means of aiding the cause which they are engaged in defending, and the witness ought to be prepared not only to answer their questions but to meet their objections to his answers. If several wounds had been inflicted on the body of a deceased party, some of which were punctured and others contused, and the indictment laid that death had ensued from the punctured wounds only: it would become of the highest importance to counsel in defending the prisoner, to draw from the medical witness a clear statement of the kind of wound which proved mortal. In May, 1835, a trial took place in the Central Criminal Court, in which a question of this kind was raised. A soldier was indicted for the wilful murder of a woman at Woolwich. From the depositions of several of the witnesses, it appeared that the prisoner struck the deceased violently on the head with his fist. She fell stunned by the blows and did not speak afterwards. The prisoner then drew his bayonet and stabbed the deceased several times: the surgeon who examined the body deposed that there were five wounds, two of which were flesh wounds above the breast, corresponding in shape to the bayonet produced. Two of these wounds were in his opinion decidedly mortal, one penetrating the lungs and the other the liver. The jury, before deciding on their verdict, requested the opinion of the judge whether, if the deceased had died in consequence of the first blows with the fist, the law would apply differently to the case, Mr. Justice Park who tried the case, observed, "that it would if it were not so laid in the indictment. The murder is alleged to have been committed by a deadly weapon, but the jury must take the whole case. There were mortal wounds inflicted by the bayonet and there is no evidence that the deceased died from the blows of the fist, but only that she was stunned." The prisoner was convicted, but if the surgeon could have sworn that the blows had been decidedly mortal, the case would probably have had a very different termination.

Should a person survive the immediate effects of a severe

injury, it is by no means incumbent on the surgeon to give a hasty prognosis as to the result; indeed it would commonly be highly imprudent for him to do so. Some medical jurists have divided wounds into three classes, those which are necessarily mortal,—those which are accidentally mortal,—and those which are not mortal :—they have gone further than this, they have attempted to arrange all local injuries according to these divisions, for the assumed purpose of enabling the surgeon to give at once an opinion respecting the probable result. But when we know that persons have survived what would have been denominated *necessarily mortal* wounds under the above system, and that many have fallen victims to wounds described as not mortal, we at once see the impropriety of regulating our judgment according to any such classifications. Besides the accidents which render wounds mortal, are sufficiently numerous to require a separate arrangement and to form a separate object of inquiry. Should a man survive a wound inflicted under circumstances which, if death had ensued, would make the act amount to murder, it is rarely considered necessary to examine the witness respecting the general consequences of such a wound. The mere description of it will commonly suffice to shew whether it was of a nature to produce, as the law expresses it, ‘grievous bodily harm,’ and if so, the legislature punishes the intent; for a man is not exculpated where, from unlooked-for circumstances on his part, he has failed to commit murder.¹ This is according to a very wise principle in our law, by which the intent of an offender is visited with the same punishment as if the result which he contemplated, had followed the offence. Nevertheless a surgeon conversant with his duty will be prepared to answer every question to which the examination may extend.

After having received a wound, an individual may die; in which case the question that naturally presents itself for consideration, is whether the wound is to be regarded as the cause of death. If the history of the wounded person is

¹ Vide 9 Geo. IV. Cap. xxxi.

known, and more especially if he has survived the injury so long as to require the attendance of a medical practitioner, the difficulties of this question may be commonly removed by making a very careful post-mortem inspection. But should it happen that the individual has been found dead, and that nothing is known concerning the manner of his death, we are then met by an inquiry which must precede all others in the performance of our medico-legal duties. This is :

Whether the wound was inflicted during life or after death? It is obvious that the question as to the wound having been the cause of death ought to be posterior to the consideration of the period at which it was inflicted. Notwithstanding the very great importance necessarily attached to the satisfactory settlement of this question, but few medical jurists have taken up the subject: and the consequence of such neglect is, that on most trials where evidence of this description is called for, that which is furnished, is chiefly of a conjectural nature.

A wound inflicted during life, has been commonly said to be accompanied by three signs:—by the effusion of blood, by the presence of inflammation, or by ecchymosis. We will now proceed to examine the value of these signs in detail.

Hæmorrhage. When a severe wound is found on a dead body, unattended by any marks of hæmorrhage, it is customary to look upon this circumstance as proving that it must have been produced after death. Thus in the case of Sir E. Godfrey, given in a former part of the work, the thorax was discovered to be completely transfixed by a sword, but no blood was found in the course of the wound, nor was there any appearance of extravasated blood at the orifices. This led to the suspicion that the deceased had perished in some other way, which was confirmed by a subsequent examination of the body. Nevertheless in the dead subject an extravasation of blood may be sometimes produced, supposing the wound to have penetrated a cavity,

and to have injured the viscera to any extent : and this must indeed commonly be the case, where any of the trunks of the larger veins are involved in the injury. It has been somewhat absurdly urged that blood sometimes exudes from the mouth, nose, or ears of those who have died of malignant diseases,—as if the examiner would be likely to mistake such hæmorrhage for hæmorrhage from a wound; or as if he would rest content with the sight of it, without tracing the source from which it had issued. This flow of blood in the dead subject, can never be confounded with the loss of blood from wounds, for the circumstances under which it occurs are too well known to lead to doubt respecting its origin. If an artery of any size is divided in the dead subject, there is no hæmorrhage, but if the same artery is divided by a wound inflicted on the living, the flow of blood is so copious that no doubt can possibly arise as to whether the circulation existed or not at the time of its infliction. On the other hand, the surgeon must not forget that severely lacerated or contused wounds are not commonly attended with any great degree of hæmorrhage in the living subject, notwithstanding that arteries of large caliber may be sometimes entirely torn through. The well-known case recorded by Cheselden, of a man who had his arm torn completely off at the axilla by the shaft of a windmill, affords a remarkable illustration of this fact. Notwithstanding the violent laceration and separation of muscles, vessels, and nerves, but very little blood was lost. In a case lately published by Mr. Bransby Cooper, the axillary artery was completely crushed and divided by the passage of a wheel of a heavily-laden waggon over the upper extremity : here again there was no hæmorrhage from the vessel, its extremity having become completely sealed up by a coagulum.¹ These cases, and others which might be abundantly procured from the annals of Surgery, shew that free hæmorrhage is not a necessary consequence of certain kinds of severe wounds in the living subject. It is unnecessary to dilate further upon facts with which all professional men must be familiar ; but

¹ Medical Quarterly Review. October 1833.

it is right that these facts should be so brought forward as to lead them to reflect deliberately on the circumstances, under which hæmorrhage may take place from a wound in the dead body, and under which it may not take place from a wound in the living.

Within the last few years, Orfila has undertaken several series of experiments, to determine the precise diagnostic characters of wounds inflicted after death ; but unfortunately these experiments were for the most part performed on dogs, and they do not therefore furnish us with conclusions so free from objection as could be desired. Dr. Christison has shewn that in this animal, violent injuries inflicted a given time after death, do not assume the same characters as those obtained by similar experiments on the dead human subject. The observations of this acute experimentalist have been chiefly directed to the effects produced by contusions after death, of which I shall presently have occasion to speak. In the mean time we will pursue the inquiry, by directing our attention to the difference in the appearances assumed by *Incised wounds*.

If an incised wound has been inflicted *during life*, and while the circulation was continuing in its ordinary state of activity, the edges, when examined recently after death, will be found separated, and the cellular tissue more or less filled with blood, so as to give to the wounded part a deep red colour: if the wound has not been interfered with, coagula of blood will commonly be found lodged within the interstices of the divided edges,—the quantity of these depending on the size or number of the wounded vessels. If life have been protracted for eighteen or twenty-four hours after the receipt of the injury, the edges of the wound may be found thickened and swollen, indicating the establishment of the process of *inflammation*. The presence of inflammation in the wounded part has been already mentioned as a sign of the wound having been received during life: but it will be perceived that this is a condition which must depend entirely upon the length of time that has elapsed since its infliction and before the death of the party. Therefore, although the existence of the process in a wounded part

may be regarded as a sure and infallible sign of the individual having been living when wounded, its non-existence can afford no proof of the contrary, for an individual may perish from the effects of the wound or other causes, before it could be established.

The following experiments, to determine the characters of an incised wound inflicted *after death*, were undertaken by a friend and myself in the summer of 1832. Opportunities but rarely present themselves, where such inquiries can be pursued upon the human body so soon after dissolution, as the nature of the investigation requires. In consequence of this obstacle, we selected some limbs immediately after amputation; and the results obtained by experimenting on these limbs, will, I think, suffice to give us an idea of those which would follow similar experiments performed on the recently dead subject.

In the first, an incised wound about three inches in length was made in the upper part of the calf of the leg *two minutes* after its separation from the body, by which the gastrocnemii muscles and the fascia covering the deep-seated layer of the leg were divided. At the moment that the wound was made, the skin retracted considerably, causing a protrusion of the adipose substance beneath: the quantity of blood which escaped was small, the cellular membrane by its sudden protrusion forwards seeming mechanically to prevent its exit. The wound was examined after the lapse of twenty-four hours,—the edges were red, bloody, and everted,—the skin was not in the least degree tumefied but merely somewhat flaccid. On separating the edges, a small quantity of fluid blood escaped, but no coagula were seen adhering to the muscles. At the bottom of the wound, however, and in close contact with the fascia, we found a small quantity of coagulated blood, but the coagula were so loose as readily to break down under the finger.

In the second experiment, an incision of similar extent was made on the outer side of the leg, penetrating through the peronei and into the flexor longus pollicis of the deep-seated layer of muscles, *ten minutes* after the separation of the member from the body. In this case the skin appeared to

have lost its elasticity, for the edges of the wound became but very slightly everted; scarcely any blood escaped from it. On examining the leg twenty-four hours afterwards, the edges of the incision were pale and perfectly collapsed, presenting none of the characters of a wound inflicted during life. Still, at the bottom of the wound, and enclosed by the divided muscular fibres, we met with some coagula of blood, but these were certainly fewer than in the former experiment. A portion of liquid blood had evidently escaped owing to the leg having been moved.

Other experiments were performed at a still later period after the removal of the limbs, and it was found that in proportion to the length of time suffered to elapse before the production of the wound, so were the appearances less distinctly marked, that is to say, the less likely were they to be confounded with similar injuries inflicted upon the living body. When the incised wound was not made until *two or three hours* after the removal of the limb, although a small quantity of liquid blood was effused, no coagula were found. The edges of an incised wound made twenty-four hours after death, will be found yielding, inelastic, in close approximation, and, as far as our observations extend, free from any coagula of blood.

Ecchymosis, from *ἐκχύω*, *effundo*. This is nothing more than the discolouration of the skin, produced by an extravasation of blood into the cellular texture. It is commonly the result of a contusion, but it may occasionally take place in obliquely penetrating wounds, where the blood from a wounded vein cannot escape, and the surrounding cellular texture freely receives it. Generally, an ecchymosis is superficial, affecting only the layers of the skin, and shewing itself externally under the form of a deep blue or livid patch;—sometimes it is deep-seated, and then its extent cannot be so readily judged of by the external discolouration, for this is commonly slight. In deep-seated extravasations, the skin often undergoes no perceptible alteration in colour until after the lapse of four, six, or eight days;—about this period, the surface may

acquire a violet, greenish, or yellowish hue : sometimes, in these cases, the discolouration is not seen immediately over the contused part, but at a certain distance from it. In the superficial extravasations, the ecchymosis is often instantaneously produced, and this is especially seen where the cellular texture is abundant and free, although the colour continues to increase in intensity for five or six hours, at the end of which time it is commonly of a deep blue.

The changes which subsequently take place in the colour of an ecchymosed spot; are worthy of the attention of the medical jurist, since they will serve to aid him in giving an opinion as to the probable time at which a contusion has been inflicted. After a certain period, the blue or livid margin of the spot is observed to become lighter ; it acquires a violet tint, and before its final disappearance it passes successively through shades of a green, yellow, and lemon colour. During this time the spot becomes much increased in extent, but the central portion of the ecchymosis is always darker than the circumference. These changes have been referred by Chaussier and others to the gradual dilution of the extravasated blood by the serous fluid of the cellular membrane, and its slow and uniform dispersion throughout the cells. The colour is finally entirely removed by the absorption of the extravasated blood.¹ The extent and situation of the ecchymosis, the degree of violence by which it has been produced, as well as the age and state of health of the person, are so many circumstances which may influence the progress of these phenomena. Where the cellular membrane is dense, the ecchymosis, *cæteris paribus*, is not so rapidly formed; nor, when formed, do the above changes so speedily take place in it, as where the blood is effused into a loose portion of the membrane, like that surrounding the eye or existing in the scrotum. On examining the ecchymosed portion of skin which has suffered from a severe contusion, we find that the discolouration affects more or less the whole substance of

¹ ORFILA. Vol. II. p. 407.

the cutis as well as the cellular membrane beneath : this, it is necessary to remember in forming our diagnosis.

It not unfrequently happens that the ecchymosis produced by a contusion, will assume a form indicative of the means by which the violence was offered. In hanging, the impression formed by the cord on the neck is sometimes ecchymosed and indicates its course with precision,—so also in strangulation, where the fingers have been violently applied to the fore part of the neck, the indentations produced, will serve to point out the manner in which life was destroyed. A case is mentioned by Starkie, which shews that the form of an ecchymosis may occasionally furnish very strong presumptive evidence against an accused party : it occurred some few years since. In an attempt at murder, the prosecutor, in his own defence, struck the assassin violently in the face with the key of the house-door, this being the only weapon he had near at hand. The ecchymosis which followed this contusion, corresponded precisely in the impression produced on the face, to the wards of the key, and it was chiefly through this very singular and unexpected source of evidence, that the assassin was afterwards identified and brought to trial.¹

For our knowledge of the effects of external *Contusions* on the recently dead subject we are chiefly indebted to Dr. Christison. This gentleman found that blows inflicted for some hours after death, will give rise to appearances on the skin similar to those resulting from blows inflicted recently before death. The livid discolouration thus produced, generally arose from an effusion of the thinnest possible layer of the fluid part of the blood on the outer surface of the true skin, but sometimes also from an effusion of thin blood into a perceptible stratum of the true skin itself. He likewise found that dark fluid blood might even be effused into the subcutaneous cellular tissue in the seat of the discolourations, so as to blacken or redden the membranous partitions of the adipose cells, but this last effusion was never extensive. From this then, it follows, that by those

¹ Law of Evidence. Vol. I. Art. Circumstantial Evidence.

who trust only to external appearance, contusions made after death may be confounded with those which are produced by violence immediately before death. The correctness of this statement is fully exemplified by the following occurrence which was related to me by Dr. Christison. It appears that while he was engaged in performing the experiments from which the conclusions that I am now giving were chiefly drawn, he selected for the subject of a series of these, the body of a female who had died in the Infirmary. A very short time after this woman had ceased to breathe, he caused to be produced upon the members and trunk, several severe contusions. The body was subsequently carried to the dead-house, and it was accidentally seen, while lying there, by some parties who had not known of the performance of the above experiments. A report was circulated immediately, that the woman had been barbarously treated before death, and it was rumoured that she died in consequence of the injuries which she had sustained. So strong was this prejudice that the interment was not allowed to take place until a full inquiry had been instituted into the circumstances. Dr. Christison attended and gave a satisfactory explanation of the facts. The popular error which arose respecting the injuries in this case, is as strong a proof as can be adduced of the similarity of the appearances assumed by such injuries when inflicted on the living and recently dead. We may also learn from it, to be cautious in listening to reports of the ill-treatment of a person during life from the presence of similar marks of violence, until we have satisfied ourselves that they were really inflicted on the living body.

If the contusion has been produced some time before death, there will be swelling of the part and probably also certain changes of colour in the ecchymosed patch, in either of which cases the examiner can have no difficulty in forming a diagnosis. Although ecchymosis may be produced after death, the changes in colour can never take place, so that the slightest appearance of such a change at once removes all doubt. If the blood found under the ecchymosed spot is in the state of coagulum, this is

considered by Christison to afford a remote presumption of its having been effused during life, although he subsequently admits that the coagulation of the effused blood proves that the effusion must have taken place before death, or *very soon after it*; and the experiments related, in speaking of incised wounds, prove that the blood effused from a wound ten minutes after death may be found in a coagulated state. Again the circumstance of the blood effused under a contused wound being liquid, is not to be considered as a proof that the effusion did not take place during life, for sometimes the effused blood will not coagulate after death. Dr. Christison mentions as a particular instance, that the blood effused into the spinal canal during life is often fluid: and it is well known that the blood may be found coagulated in some parts of the body, while it remains uncoagulated in others. Those contusions produced during life, in which the effused blood remains liquid, may, according to Dr. Christison, be recognized by the extent of the effusion. If under the ecchymosed part, we find a large quantity of liquid blood and the seat of injury is so situated that the blood could not have become infiltrated into it, and at the same time there is no ruptured vein from which the blood might flow, we may confidently pronounce that the effusion must have preceded death. In a dead body, a contusion would cause but little extravasation, unless a vein of very apparent size were torn through. The sign which is most satisfactory, in the opinion of this experimentalist, to establish a diagnosis, is the following. In a contusion inflicted during life, the ecchymosed portion of cutis is generally dark and much discoloured by the infiltration of blood throughout its whole thickness,—the skin at the same time is increased in firmness and tenacity. This is not, however, a uniform consequence of a contusion during life, for a blow may cause extensive extravasation below the skin without affecting the cutis in the manner stated. According to the observations of Christison, the state of the skin above described, cannot be produced by a contusion on the dead subject; but it is questionable whether it might not be produced if the contusion were inflicted a *few minutes* after

death. As it is, its value is somewhat circumscribed,—it is not always produced on the living,—it might be possibly produced on the recently dead, so that where it does not exist, we must look for other diagnostic marks, and where it does exist we ought to satisfy ourselves that the contusion was not inflicted recently after death.

The period at which such injuries cease to resemble each other, has not been fixed with any degree of precision, but, as in the case of incised wounds, it would seem that there is but little danger of confounding them when the contusion has not been inflicted on the dead subject, until after the disappearance of animal heat and the commencement of cadaverous rigidity. Dr. Christison remarks, that sometimes the appearance of contusions can hardly be produced two hours after death, sometimes they may be slightly caused after three hours and a quarter, but this period, in his opinion, is near the extreme limit. Whenever the warmth of the body and the laxity of the muscles are not considerable at the time the injury is inflicted, the appearance of vital contusions cannot be very clearly produced. It is probably, therefore, only on the trunk that, even in the most favourable state of the body, namely, when the blood remains altogether liquid, any material mark resembling contusion can be produced so late as two hours after death.¹

Notwithstanding these very satisfactory results, it will be seen, that from the moment of death until after the lapse of two hours, contusions may be followed by appearances on the dead body almost identical with those observed on the living. The earliest period after death in which an experiment was tried by Dr. Christison on the human subject, was one hour and three-quarters : in this case the similarity was so strong that we may infer, if the experiments had been performed within half an hour, or even one hour after dissolution, a clear diagnosis would have been scarcely possible. The inferences which it appears to me we are entitled to draw from the preceding observations, are :

¹ Edinburgh Medical and Surgical Journal. No. XCIX. p. 247 et seq.

I. The discovery of effused blood about a wound, is not of itself a proof that that wound was received during life.

II. The absence of all appearance of hæmorrhage from a wound, is not a proof that it was received after death.

III. The fact of blood being found coagulated in wounds of whatever description, is not a positive proof that the wound was received during life.

IV. The liquidity of the effused blood is also far from proving that that wound was produced on the dead body.

V. The appearances of ecchymosis may arise from the application of similar violence on the living and recently-dead subject.

There are two circumstances which may accompany wounds on the living, but are never simulated on the dead, these are :

I. The signs of inflammation.

II. The changes of colour in an ecchymosed part.

The remarks made on the subject of *Contused* wounds will equally apply to those which are *Lacerated*. With respect to the diagnosis of *Fractures*, the surgeon will experience greater difficulty unless the fracture has been produced some time before the death of the party. There are no signs, so far as I am aware, by which a fracture produced ten minutes before death can be distinguished from one, which has been produced ten minutes after death. The ecchymosis, and effusion of blood followed either by coagulation or not, would be, I should presume, so similar in the two cases, that medical science could not serve to establish a distinction. If the fracture has been caused some time prior to death, then we may expect to meet with tumefaction of the surrounding parts and other appearances of inflammation. The presence of coagula of blood between the interstices of fractured bones, was the sign chiefly relied on by former surgeons, to distinguish a fracture in the living from a fracture in the dead ; but it is obvious, from the preceding remarks, that such a sign can only serve to prove that the injury took place recently before or recently after death. Should the

evidence establish that a fracture must have been produced during life or *many* hours after death, then the discovery of coagula of blood, between the fractured edges of the bone, would at once decide the case; for after the cooling of the body it is altogether improbable that any blood which is effused should become coagulated. In making this frequent use of the terms 'during life' and 'after death,' the reader must bear in mind that they are employed in their general and legal and not in their *physiological* sense. In common language we say that a person is dead at the moment that the functions of respiration and circulation are totally annihilated, and our law would imply the same; but physiologically speaking, we do not consider that the body has lost the whole of its vitality, until cadaverous rigidity has terminated and decomposition has commenced. It is then during the presence of this lingering vitality in the system, and more especially soon after the cessation of the functions above-mentioned, that the injuries of which we have been speaking are liable to create ambiguity: and that ambiguity may exist and form a fair ground of defence in charges of murder by wounding, is well known to those members of the legal profession who have undertaken the prosecution or defence of such cases.

There are certain conditions of the body in which ecchymosed marks are found on the skin, and which the practitioner must be careful not to confound with the ecchymosis arising from violence. First, with regard to the *living* body—in very aged persons, it is not unusual to find the legs and feet covered with livid patches, sometimes of considerable uniformity of colour, at others very much mottled. These discolourations, which, after death, might be mistaken for ecchymosis from violence, are owing to the languor of the capillary circulation in such subjects: the blood with difficulty finds its way through the venous capillaries, and the marks are commonly observed on this part of the body, because it is far removed from the centre of circulation, and the blood has to rise contrary to the law of gravity. This is the condition which has been denominated by Andral,

asthenic hyperemia.¹ Similar discolourations are sometimes met with on the bodies of those who have died from scurvy, typhus, and other adynamic diseases. In persons severely affected with scurvy, it is well known that the slightest pressure on any part of the skin will suffice to produce a spot resembling ecchymosis, and arising like it from a rupture of minute cutaneous vessels; but the extravasation of blood, which causes the discolouration, is commonly confined to the superficial layers of the true skin. These spots, under certain states of the system, arise spontaneously, and often cover the body to a great extent; when small, they take the name of *petechiæ*, but when extensive, in which case they bear a very close resemblance to the ecchymosis of violence, they constitute the chief pathognomic character of the disease termed *purpura*. To all these effusions of blood in the living body the term *Sugillation* (from *sugillatio*—a black mark), has been applied. Some medical jurists have attempted to draw a distinction between ecchymosis and sugillation,—thus they have said that ecchymosis proceeds from external, sugillation from internal causes,—ecchymosis is confined to the marks which occur in the living body, sugillation, to those which occur in the dead,—in ecchymosis the vessels are ruptured, in sugillation there is mere congestion;—again, some have considered that ecchymosis and sugillation might take place both in the living and in the dead. From this statement it will be perceived that it is impossible to give a consistent definition of the meaning of either of these terms; but it is altogether unnecessary to make the attempt, for the error, after all, consists in the introduction of a superfluity of words to express a simple condition of the body, depending on different causes. Why an ecchymosis should not also be called a sugillation, it is difficult to say, for so far as we are bound by a comparison of the various definitions above given, with the usual applications of these words, the terms are equally appropriate. I would advise the medical jurist to avoid carefully the use of the term sugillation, if by

¹ ANDRAL. *Anatomie Pathologique*. Vol. I. p. 40.

employing it, he considers that he is speaking of a condition intrinsically different from ecchymosis.¹ The most important point for him to attend to, is to distinguish these ecchymoses in the living body arising from infirmity or disease, from those which have their origin in violence. In regard to the spots on the legs of old persons, the appearance of the subject, and their general extent, enveloping as they often do, the whole circumference of the leg, must suffice to establish a correct diagnosis. In distinguishing the spots of *purpura* a difficulty may sometimes exist,—but here also the appearance of the subject, the general diffusion of the spots over the whole of the body, and their existence on the mucous membrane of the fauces and alimentary canal, cannot fail to point out that they originate from some other cause than violence. It has been alleged on the authority of Zacchias, one of the early writers on Medical Jurisprudence, that a diagnosis is obtained in these cases by a dissection of the part. On this authority, in what is termed sugillation, *i. e.* the ecchymosis of disease, the blood is stated to be fluid, while in the ecchymosis of violence it is described as being in a thick and concrete state. In the remarks already made respecting contusions, facts have been mentioned which shew that such a mode of distinction is inadmissible: neither the state of the blood nor its situation will alone suffice to determine the question. Although it has been usual to describe the ecchymosis of disease as being due to a superficial extravasation on the true skin, yet the cases recorded by Stoll and other pathologists, prove that in *purpura* the discolouration may occasionally extend through the whole substance of the integuments to the adipose tissue beneath.

Secondly, With regard to the *dead* body. Ecchymosis may present itself in two forms on the skin of a dead subject. The first form, when it occurs, is almost an

¹ In medical jurisprudence, too much attention cannot be bestowed on the value of words, and the precise signification attached to them: the employment of vague and ambiguous terms in evidence, must always be followed by serious consequences. LOUIS long ago observed—"Œquivoca verborum acceptio graves in theoriâ gignit errores, vitiosiores in praxim ferens, mox luctuosiores in usu forensi daturus."

immediate consequence of death, but it is not fully developed until the body has cooled. It presents itself in diffused patches of very great extent, sometimes covering the whole of the fore part of the chest and abdomen, at other times the lateral regions or the back. The upper or lower extremities either on their internal or external surfaces, or on their whole circumference, are often thus completely ecchymosed. The colour is sometimes purple, sometimes livid, and often mottled in interspaces, but it is commonly well defined in its extent by the whiteness of the surrounding skin. This form of ecchymosis is almost invariably seen on the bodies of those who die suddenly or by a violent death, as in individuals who perish from apoplexy or who are hanged. When the skin is divided, the colour is seen to be confined to the upper surface of the cutis, and never to extend through it. This discolouration is ascribed to the congestion which takes place in the capillary system at the moment of death in subjects which are full of blood. The arteries at this time retain sufficient contractile power or tonicity, to force the blood onwards into the capillaries, where it collects in irregular masses, but whence, owing to the speedy extinction of the vital forces, it cannot be propelled into the venous system. The circumstances under which it occurs, and the characters above described, distinguish it from the ecchymosis of violence. Its existence on the dead body must be regarded as a sign of the vigour and activity of the circulation at the moment of death, and generally as a mark of death having taken place suddenly.

Sometimes, instead of seeing this cadaverous ecchymosis¹ diffused in large patches over the cutaneous surface, it will be disposed in stripes which traverse and intersect each other in all directions, and often cover the whole of the body. These marks which vary from a scarlet to a dark

¹ It might seem improper to call this, which has been described as a mere capillary congestion—'*ecchymosis*'—this word signifying effusion; but the term *sugillation* has been so vaguely employed by different writers, that I think the former preferable to the latter, in spite of the apparent inconsistency of its application.

red or livid hue, have been supposed to resemble those produced on the skin in the act of scourging or flagellation. On this account they have been called *vibices*, from the latin *vibex*. Sometimes the body is completely covered with them,—they are often of considerable length, and pass in a very symmetrical but occasionally tortuous course: they are chiefly observed about the sides, the upper part of the shoulders, and back. In meeting with this appearance for the first time on a subject, an individual, unacquainted with its nature, might look upon it as a strong proof of violent treatment during life, especially in a case of suspected violence; but the practitioner will distinguish it readily by the uninjured state of the cuticle and the superficial nature of the discolouration, from those marks of violence which it is considered to resemble. In general it appears to be produced by the wrapping of a body in a sheet or other covering soon after death, and allowing it to cool while thus wrapped up: even if a subject be allowed to cool merely with the clothes covering it, these peculiar marks will often be seen. In many cases they exist only on the back, and here they are to be ascribed to the pressure produced by the irregularities or folds in the sheet on which the body has been lying. About two years since I saw a well-marked case of *vibices*, in which the suspicion was so strong that violence had been used to the deceased, that a coroner's inquest took place. The fore part of the body was covered with these stripes, which were of a red and livid colour: they seemed to me to correspond exactly to the folds of a sheet drawn tightly across the chest, and I subsequently ascertained that the body of the deceased had been treated in this way after death. The blood was superficially diffused, and the cuticle sound. The circumstance above-mentioned at once satisfactorily explained the cause of the appearance. These *vibices*, like the cadaverous ecchymosis already described, are commonly seen in plethoric subjects; they also indicate great vigour of circulation at the moment of death.

A second form of ecchymosis observed in the dead body, is that which occurs some time after death. This appears

to proceed from an infiltration of blood into the depending parts of the body and to be a result of incipient putrefaction. Those engaged in post-mortem inspections, are well aware that the skin of the back, especially that covering the loins and buttocks, often presents irregular discolourations resembling ecchymosis. The skin of the occiput is a well-known seat of this form of ecchymosis. On cutting into the skin in any of these parts, the whole of the cutis is found to be more or less discoloured, and the adipose tissue is filled with a sanguineous serum which readily escapes. In proportion as putrefaction advances, the discolouration becomes greater, passing from a dark red to a green colour. The general characters of this species of ecchymosis are so well marked, that it cannot easily be confounded with the ecchymosis of violence. The parts of the body in which it is known to occur, as well as the state of the body distinguish it from all other forms described. This variety of ecchymosis is also termed sugillation by some medical jurists.

Having then treated of the characters assumed by wounds inflicted during life and after death, and stated those objections which might be urged by an intelligent barrister to the conclusions founded on them, it will be proper to direct the attention of the reader to the evidence given on some trials of recent occurrence, in which these characters became an important object of inquiry.

William Burke and Ellen Macdougall were tried on the 24th December, 1828, before the Justiciary Court of Edinburgh, for the murder of Margery Campbell. The evidence in the case, as abridged from the report published by Dr. Christison, was as follows.¹

The deceased was last seen alive by several of the witnesses, drinking in the house of Burke, about 11 o'clock on the evening of the murder. On the following day she was missed by some of these witnesses, and on searching over the premises of Burke, her dead body was discovered lying concealed in some straw. Information was speedily given

¹ Edinburgh Medical and Surgical Journal. April 1829.

to the police, but when a search was made by the officers, the body of the deceased could not be found. They were enabled, however, to trace it to a dissecting room to which it had been in the mean time conveyed in a tea chest, and in this it was found doubled up with the knees on the breast, and the face on the knees, the head being uppermost. From the confession of an accomplice it subsequently appeared, that Burke had destroyed the deceased by sitting on her body, at the same time covering her mouth and nose with one hand, while he applied the other forcibly under the chin.

The body, which was examined by Dr. Christison and Mr. Newbigging, about fifty-nine hours after death, presented the following appearances. The features were somewhat more turgid than natural, the conjunctivæ of the eyes blood-shot, and the lips of a dark livid colour; the face was generally livid, and there were a few marks of contusions about the extremities and body. The contents of the cranium and abdomen presented nothing remarkable: the stomach was distended and contained a quantity of pulpy matter without any spirituous or narcotic odour. The contents of the thorax were perfectly natural, the lungs but little gorged, while the heart and great vessels connected with it, contained a quantity of dark fluid blood.

Upon proceeding to examine the spinal marrow, blood in a semi-liquid state was found extravasated under the trapezius muscle, near the inferior angle of the scapula, as also in the left lumbar region, but there was no outward mark of contusion upon the integuments corresponding to these effusions. Extravasated blood was likewise discovered in the cervical and dorsal regions, especially in the former. The ligaments connecting the vertebræ posteriorly were ruptured, but there was no fracture. On the sheath of the spinal cord opposite to the rupture, there was a mass of semi-fluid black blood about the thickness of a penny piece, and one inch in diameter; from this a thin layer of the same kind of blood extended along the posterior surface of the sheath, as far down as the lowest dorsal vertebræ. The spinal cord

was uninjured, and no blood was found extravasated under the sheath.

Dr. Christison was not at this time aware of the manner in which the deceased had been destroyed, and candidly admits, that from all the circumstances, he was at first inclined to attribute her death to the violent injury done to the spine. Some experiments, however, which he instituted, led him to alter this opinion, and at the precognition he stated, "that the injury of the spine might have been caused so late as seventeen hours after death, as well as during life; that the question whether death arose from natural disease or violence, did not admit of a positive answer; that the fluidity of the blood, the ruffling of the cuticle over the throat, the lividity of the face without lividity elsewhere, and the great redness of the eyes, with the fact of blood having been found where the body had lain, were signs which, although they did not amount to proof, might of themselves lead to a suspicion of death by strangling;—and that when this circumstance was taken in conjunction with the signs of other violent treatment by contusions during life, the perfect state of health of the deceased a few hours before her death, and the want of any appearance in the dead body to indicate natural death, it appeared *probable* that she had died by violence." This is also the substance of the evidence which was given on the trial of the prisoners, the witness admitting that the appearances in the dead body corresponded precisely with the evidence of the accomplices as to the manner of death. On cross-examination, the prisoner's counsel endeavoured to establish the possibility of accidental suffocation from excessive drinking, but, in opposition to this, it was very properly urged that if death had taken place from this cause within so short a space of time, spirits would certainly have been discovered in the stomach.

The prisoners, as it is well known, were condemned and executed, and no doubt can exist of the justice of their sentence; but for his own satisfaction, and to remove some difficulties which occurred to him during the investigation, Dr. Christison undertook the series of experiments relative

to contusions and effusions of blood in the living and dead subjects, which have already been described. In the course of these experiments, he ascertained that the marks of violence observed about the spine in the body of the woman Campbell, might be produced seventeen hours after death, he having actually succeeded in producing them by bending the head forcibly down upon the chest in a subject which was cold, and in which all the joints were stiff. It was this circumstance that led him to reject the explanation which he was at first inclined to offer in accounting for the death of the deceased. The absence of all positive evidence of the manner of death on the examination of the body, cannot excite our surprise when we know from the confession of an accomplice, how the murder was committed. Dr. Christison remarks, that a conviction has gained ground among the public, and has been encouraged by some medical men, of the signs of suffocation in a dead body being so obvious and characteristic that, without reference to collateral circumstances, they would at once attract the attention of a professional person, and excite a strong suspicion of the cause of death. Such appearances, however, are far from being always present, and when present might be readily overlooked unless suspicion were already excited.

In the year 1831, a trial under somewhat similar circumstances, took place in London. Three men were charged with the murder of Carlo Ferrari, an Italian boy : two of the prisoners were found guilty of the crime, and subsequently underwent the sentence of the law. The body of the deceased was taken to the dissecting room of King's College, where, from its extreme freshness and healthy appearance, it led to a suspicion of murder against the parties who brought it. It is unnecessary to recapitulate the circumstantial evidence adduced against the prisoners,—it was of the most conclusive character, and left no room to doubt their guilt. The medical evidence, however, is of importance in relation to the present part of our subject, and to this, therefore, I wish to call the attention of the reader.

The body of the deceased was examined, as it was calcu-

lated, about fifty hours after death. The face was swollen, the eyes were blood-shot, the teeth extracted, and the gums bloody. With the exception of a trivial wound over the left side of the frontal bone, there were no indications of external violence. On reflecting the integuments of the cranium, it was found that there was a small patch of coagulated blood effused between the pericranium and bone immediately over the coronal suture. The brain with its membranes and vessels, appeared in a perfectly healthy state; but upon removing this organ, a quantity of fluid blood escaped from the spinal canal at the foramen magnum. On making an incision posteriorly through the deep-seated muscles of the cervical region, coagulated blood to the amount of five or six ounces was found extravasated among them, extending from the occiput to the termination of the cervical vertebræ. The arches of the vertebræ and the under and posterior part of the occipital bone immediately behind the foramen magnum were removed, and from one to two ounces of coagulated blood were discovered between the spinal canal, exterior to the theca and pressing upon the upper part of the spinal marrow. A large quantity of fluid blood was also found effused in the lower part of the canal, but there was no blood within the sheath of the cord, and the cord itself was perfectly healthy. There was no appearance of injury either to the vertebræ or their ligaments. On opening the thorax, the lungs were discovered to be quite healthy and not congested,—there were old and partial adhesions between the right lung and pleura costalis, and each cavity of the pleura contained about an ounce of serum. The heart was rather small, contracted, and its four cavities perfectly empty. In the pericardium, there were about two drachms of serum. The pharynx, œsophagus, larynx, trachea, and bronchi, were healthy and unobstructed. In the abdomen, the stomach was found full of half-digested food, having a slight smell of rum. The other viscera were in their natural state.

All the medical witnesses on the trial, stated it as their opinion that the deceased had been destroyed by a blow on the back of the neck, which had caused the extravasation of blood found on the sheath of the spinal marrow. They

admitted it to be possible, but altogether improbable from its situation and other circumstances, that this blow should have been self-inflicted :—they also stated that death could not have been caused by any mode of suffocation, as by drowning, hanging, or strangulation.

The confession, made by the prisoners subsequently to their conviction, did not bear out this view of the manner in which the deceased was supposed to have been destroyed, and we may therefore inquire into the correctness of the data on which it was founded. That the injury to the upper part of the spine was adequate to account for death, could not be doubted, but it was first necessary to shew that this injury had been inflicted during life, and that it possessed characters which clearly proved that it could not have been produced after death. Neither of these conditions was established in evidence. It was affirmed that the injury was caused by a blow, although there was no mark of violence on the skin where such a blow must have been inflicted ; and to account for the absence of a mark, one of the witnesses stated that it would have been seen if the boy had lived some time after the blow had been given, a statement which is opposed to the result of Christison's experiments, in which ecchymosis was produced, even where the person had been dead some hours. The absence of any mark of violence on the back of the neck, would then tend to shew that no blow sufficient to produce extravasation in the spinal region had been inflicted during life ; and neither the effusion nor coagulation of the effused blood would support the opinion of the witnesses, for experiments have been already detailed in which these appearances had been readily caused by violence on the dead subject. There is every reason to believe, as an intelligent reviewer has suggested, that the extravasation of blood, and the injury observed about the spine in this case, were caused in the same way as in the woman Campbell, namely, by the bending of the head forcibly on the chest in packing the body.¹ The coagulated state of the effused blood proves either that the

¹ Medical Gazette. Vol. IX. p. 480.

violence was inflicted during life, or soon after death, while the subject was yet warm; and the absence of ecchymosis from the skin above the part, renders it highly improbable that the effusion was produced by a blow. In concluding the account of this case, I shall take the liberty of making a remark upon the statement of some of the witnesses, that the death of the boy could not have been caused by any mode of suffocation. It is true that the lungs were not found congested, while the heart was collapsed and its cavities destitute of blood; but the lungs are not always in a state of congestion in death from asphyxia, nor is the condition of the heart remarked by the witnesses, common in any form of death, whether from asphyxia or from the effects of violent blows. The emptiness of this organ offers no greater obstacle to the admission of the opinion that the boy perished from suffocation, than that his death took place in the manner imagined by the witnesses. From the confession of the prisoners it appears, that after having stifled the deceased, they lowered his body into a well with the head downwards, taking care to keep his mouth below the level of the water.

The precise manner in which the deceased was destroyed, did not become a material question on the trial; the guilt of the prisoners being clearly established by the strongest general evidence; but if positive proof of the real manner of his death had been necessary to ensure their conviction, it is more than probable that in the hands of an intelligent barrister, the case might have been successfully defended.

Detection of wounds long after death. The purposes of justice sometimes require that the body of a person should be exhumed long after interment, and the medical examiner may be expected to state whether after a given time, any and what local injuries can be identified. If the conditions for putrefaction exist, a wound involving the soft structures of the body, will undergo very rapid changes after death. It has been already observed, (p. 90.) that the marks of contusions, such as ecchymosis and extravasations of blood, become much extended during putrefaction, and might, to

one unacquainted with this fact, convey a very exaggerated idea of the degree of violence inflicted on the person. This circumstance should not therefore be lost sight of by those who are summoned to execute a duty of the nature here specified. If the surrounding structures be at all putrefied, the examiner may still define the extent of the wound, but it will be impossible for him to determine whether it was inflicted before or after death, unless there should be well-marked traces of inflammation still remaining. In subjects interred soon after dissolution, and where the soil favours the conversion of the soft parts into adipocere, the physical characters of a wound may be preserved for a very long period, but still there exist no means for discovering whether it was inflicted on the living or dead subject. Solutions of continuity, involving the hard parts of the body, remain visible and recognizable for months, and even years, after interment. Orfila mentions a case which occurred in the year 1822, at Amiens, where the manner in which an individual had been murdered, was satisfactorily determined after the body had been interred between eight and nine months. The occipital bone had been driven into the cerebellum by some blunt weapon, similar to one found in the possession of the prisoner, covered with dried blood and hair; upon applying the back part of this weapon to the fractured portion of the deceased's skull, there was a most perfect correspondence. The conviction of the murderer followed this completion of the circumstantial evidence.¹ Several cases of a similar kind are quoted by the same writer, which, however, are not of sufficient interest to call for particular notice; but there is one among the number wherein some of the conclusions arrived at by those concerned in the medico-legal examination, are so remarkable as to require a few comments. The skeleton of a human being was discovered buried in a cellar at Versailles, in July 1828, the bones of the cranium being much fractured. After having defined the sex, the probable age, and period of interment, which they considered to be about two or

¹ *Traité des Exhumations*. Vol. II. p. 341.

three years previously, the examiners proceed to state, that the injuries observed on the skull were inflicted during life, because they had found spots of blood on the malar and temporal bones ;¹ and from the positions of the bones of the upper extremities, they inferred that the deceased must have been interred in the spot where the body was discovered, before cadaverous rigidity had affected the muscular system. Orfila has truly remarked in another part of his treatise, that we cannot do a greater injury to the science of Legal Medicine, than by representing it as capable of furnishing evidence which its principles do not safely warrant. A bone may be fractured, and the fractured portion may become accidentally spotted with blood, as readily after death within a certain period, as during life ; and how, therefore, is the medical jurist to avail himself of such a fact as evidence of a wound having been vital where the body has lain in the ground two years and upwards ? It is possible that the skull of the deceased in this case may have been severely fractured during life, that he may have died from this violence, and that his body may have been buried previously to the commencement of cadaverous rigidity ; but it is not by a reference to any of the sound principles of medical jurisprudence that such points can be put forward as evidence by the witness : it must be left exclusively to the judicial authorities to clear up questions of this nature. If from other facts it be made probable, that the injury observed on the osseous parts of a subject, was received by the deceased while living, the witness is competent to speak to the probable effects of the injury,—whether it were sufficient to account for death or not, as well as the kind of instrument used ; but his science cannot enable him to determine the time at which the violence was received. This, together with the statement of the age, sex, and probable interment, is what is chiefly required as medical evidence on these investigations. In the case of Clarke, who was murdered many years since by Eugene Aram, the traces of the fracture and indentation of the temporal bone,

¹ *Traité des Exhumations*. Vol. II. p. 359.

were plainly distinguished on the exhumation of the skeleton of the deceased, although thirteen years had elapsed from the time of the murder! The manner in which the murder was committed, was confessed by an accomplice, and the medical evidence corroborated this confession.

Whether the wound was the cause of death? The definition of murder in the English Law includes : 1. The killing of another. 2. The existence of malice afore thought: and 3. The prisoner's act. 1. The proof of killing another involves the proof of the death of the person, *and that it was occasioned by some act done by another*. It is chiefly on this latter point that in trials for homicide by wounding, a medical opinion respecting the immediate connection of the death of the party with the wound received, becomes of the highest importance, and it is expressly laid down in our best legal works that where there is any doubt whether the death was occasioned by the act of an accused party, or by some other cause, it is a question of fact for the jury.¹ From this statement it will be perceived, that the life of a prisoner must not unfrequently rest on the medical evidence adduced, and perhaps no better argument than this can be employed to urge medical witnesses to reflect duly on the degree of responsibility which attaches to them, in the settlement of the difficult and complicated questions connected with death from local injuries. In general, it is to be observed the medical evidence is favourable to the prisoner against whom it is intended to be given, because the witness does not sufficiently deliberate on the nature of the examination which he is about to undergo. In stating his opinion at the trial, respecting the probable cause of death, he not unfrequently shews a hesitating reliance on it,—he doubts while in the witness-box,—he leaves the settlement of the points of difficulty to the last moment, and thus we find that in the uncertainty thrown on the case, the medical evidence for the prosecution often affords to the barrister who defends the prisoner, the best means for obtaining an acquittal. No man possessed of the least portion of reasonable or humane

¹ STARKIE. Vol. II. p. 943, et. seq.

feeling can object to this result, provided, medically speaking, there is no ground for believing the prisoner guilty of the charge; but where his acquittal is made to depend solely on the inconsistencies and imperfections of the medical evidence, and his guilt is obvious to all reflecting minds, we have indeed reason to deplore, for the sake of our profession and of the just execution of the law, that a door should be thus thrown open to criminals. Sometimes it happens, that the death of a party appears to be as much dependant on bodily disease as on an injury proved to have been received at the time he was labouring under disease. How is an opinion to be expressed in such a case? The course which I apprehend the medical witness ought to pursue, provided he has duly deliberated on the circumstances before he appears in court, and his mind is equally balanced between the two causes, is to state at once his doubt to the jury without circumlocution, and not allow it to be extracted from him in cross-examination. It is the hesitating to assign a satisfactory cause, or the assigning of many causes for death, that gives such advantage to the prisoner's case, even where the general evidence is entirely against him. The case given at p. 140, will shew how necessary it is for medical witnesses to be clear and distinct in their answers, as also with what indifference conjectural opinions are treated by the Court.

Occasionally many causes of death are assigned by the witness, among which some have a tendency to exculpate and others to inculpate the prisoner in a greater or less degree, and it is left to the jury to select from the number, one upon which to found a verdict. In a case of this kind an acquittal is commonly obtained. About a year since, the following trial took place on the Home circuit. The prisoner, a female of low character, was charged with manslaughter. The evidence went to shew that the deceased was first knocked down by a blow on the head, and while lying on the ground, was severely beaten, the blows being chiefly directed at her head and chest. The deceased died three days after the receipt of the injuries. The medical practitioner, who examined the body, stated that there were the marks of severe contusions externally, while the chief morbid appearance internally, was an inflamed state

of the lining membrane of the stomach and upper part of the intestinal canal. He attributed death to this condition of the stomach, bringing on sickness and bilious diarrhoea. He admitted that death might have been produced by blows, by the concussion which the body received, or by excitement. He would not undertake to swear that the state of the stomach was occasioned by blows, although he admitted it as possible that blows and stamping on the soft parts, might suffice to produce such appearances. Bilious diarrhoea seldom proved mortal unless there were something to add to it. The judge observed that the cause of death, assigned by the witness, was too remote and speculative to convict the prisoner, and the jury accordingly returned a verdict of acquittal. The reader may make his own comments upon the medical evidence in this case; but it seems clear to me, that a non-professional witness would have expressed an opinion of the cause of death in precisely similar language, and would have been just as serviceable in the case. A question here naturally suggests itself. Why is a medical man summoned on these occasions, if not to inform the jury, which, of many causes of death, is the most probable? It is no information to them, but rather an embarrassment, to hear an *ex-cathedra* opinion given that four or five causes operated to produce death, and the medical witness is not prepared to shew that one of these is more probable than another. There must undoubtedly be cases where it will be scarcely possible to determine whether death is a consequence of local injury or of co-existing disease, but it is not to be admitted as a medico-legal axiom that this event can take place from and be equally ascribable to four or more distinct causes. Such a case would at least stand alone among medico-legal reports.

In estimating how far a local injury has been concerned in producing the death of a party, there are many circumstances which often require to be taken into consideration, and a want of attention to these may endanger the lives of innocent persons, or lead to other serious consequences. It cannot therefore, be considered a waste of time if we make a lengthened analysis of this part of our subject: a result which

will be probably best obtained in laying before the reader, under so many distinct sections, the various accidental circumstances which may modify or aggravate the effects of a wound. Orfila and other continental writers have adopted this plan, and it is one which is undoubtedly well calculated to lighten the difficulties that sometimes attend these investigations; but the dispositions of the French Law, relative to wounds wilfully inflicted, are very different from those which prevail in the Law of England: it will therefore be necessary, in following the example of the above mentioned writers, to make such alterations, as will especially adapt our remarks to the principles of British Jurisprudence.

I. *A man receives a wound and dies immediately or within a few hours.* Should death take place before the surgeon sees the deceased, a post-mortem examination will inform him how far the wound was adequate to cause death. On the other hand, the individual may be living, but labouring under an injury of so severe a nature, that it is evident to the surgeon, he cannot long survive: in this case, the dying person may make a statement respecting the party by whom the injury was inflicted, and the circumstances which led to its infliction. Now the law attaches so much importance to statements made in these cases, that a medical man will act wisely in committing them immediately to paper; for the *ipsissima verba* of the dying person, have much greater weight as evidence, than any version of them which the memory of the witness may enable him to supply. If there should be time to summon a magistrate or a coroner, the depositions of the dying person may be taken in a regular and legal form, and the surgeon will be exonerated from all further responsibility in respect to them: but I am here supposing that the medical attendant is left alone, and unable to procure such assistance: in which case, it is recommended that he should not make himself too officious in extracting statements from the deceased, or in putting *leading* questions which may be the means of implicating particular parties. It is proper that he should receive and note down, what the dying individual voluntarily and freely states, and only put those questions which are necessary to amend or explain

what appears ambiguous or contradictory in his statements. The law respecting the admission of these statements is thus given by some of our best legal writers on evidence. "Declarations," observes Phillipps, "made under the apprehension of death, are constantly admitted in criminal prosecutions when the death of the deceased is the subject of the charge against the prisoner. The principle of this exception to the general rule (i. e. to the non-admission of hearsay evidence) is founded, partly on the awful situation of the dying person, which is considered to be as powerful over his conscience as the obligation of an oath, and partly on a supposed absence of interest on the verge of the next world, which dispenses with the necessity of cross-examination. Before such declarations can be admitted in evidence against a prisoner, it must be satisfactorily proved that the deceased, at the time of making them, was conscious of his danger and had given up all hope of recovery. This consciousness of approaching death is to be collected either from the circumstances of the case (as from the nature of the wound and the state of the body) or from expressions used by the deceased.¹"

Starkie says, "in order to warrant the admission, it must be shewn in the first place, that the declaration was made under the apprehension of impending death: and this may be collected from the nature and circumstances of the case, although the declarant did not express such an apprehension. Nor is it essential that the party should apprehend *immediate* dissolution, it is sufficient if he apprehend it to be impending. Whether such evidence be admissible is a question for the court and not for the jury to determine, under all the circumstances of the case."²

I have thought it necessary to make these remarks relative to dying declarations in this place, since it has most usually happened that they have been made to the medical practitioner by persons labouring under dangerous or mortal wounds; and a knowledge of the importance attached by the law to

¹ PHILLIPPS on Evidence. Vol. I. p. 235.

² STARKIE. Vol. II. p. 460.

the precise circumstances under which they are made, cannot be too universally diffused.

II. *A man receives a wound, but death does not take place for a considerable period.* Certain kinds of injuries are not immediately followed by serious consequences, but the individual may perish after a longer or shorter period of time, and his death may be as much a consequence of the injury as if it had taken place on the spot. Wounds of the head are especially liable to cause death insidiously,—the person may in the first instance recover,—he may appear to be going on well, when without any apparent cause, he suddenly expires. It is scarcely necessary to observe that a post-mortem examination of the body will suffice to determine whether death is to be ascribed to the wound or not. In severe injuries, affecting the spinal marrow, death is not an immediate consequence unless that part of the organ above the origin of the phrenic nerves, be wounded. Injuries affecting the lower portion of the spinal column do not commonly prove fatal, until after some time; but the symptoms manifested by the patient during life, as well as the appearances observed in the body after death, will sufficiently connect the injury with that event.

Death may follow a wound and be a consequence of that wound, at almost any period after its infliction. It is necessary, however, in order to justify a charge of homicide against an individual, that death should be strictly and clearly traceable to the injury and not be dependant on any other cause. A doubt on this point, must of course lead to an acquittal.

The following trial took place before Lord Abinger, on the Northern circuit, August 1835. Three boys were indicted for the manslaughter of a girl named Nesbitt. From the evidence of several children it appeared, that the parties were schoolfellows, and that on the 29th of January preceding, the deceased was standing against the wall of the school-room, when two of the prisoners seized her by the legs, threw her on the ground with violence, and then dragged her for some distance. The girl was forcibly rescued from them, but they again attacked her, and the second

time she appeared considerably hurt by them. The next morning she was unable to rise from her bed, and from that time she continued ill until her death, which happened on the 4th of March, about five weeks after the receipt of the injury. The deceased's mother admitted that the girl had complained of her knee before the alleged violence was inflicted; and a medical witness having given it as his opinion, that the girl had died from a swelling in the knee-joint, and not from the violence, the judge directed an acquittal.

Many cases might be quoted from the works of surgical writers, in illustration of the length of time which may elapse, before death takes place from certain kinds of injuries,—the injured party having ultimately fallen a victim, if not to their direct, at least to their indirect consequences. One of the most striking instances which I have met with, is that related by Sir A. Cooper, of a gentleman of Yarmouth, (vide p. 420) who died from the effects of an injury to the head, received about *two years* previously. In this case, the connection of death with the wound, was clearly made out by the continuance of the symptoms of cerebral disturbance during the long period which he survived. Did it not rest upon good authority, I should be inclined to reject the following case, which is said to have formed the subject of a memoir, read not long since before the Anatomical Society of Paris. An individual received a musket-shot in the left side of the thorax, and the ball remained lodged in the left lung during a period of *twenty-five years*. The ball in penetrating, had fractured the humerus at its neck, in consequence of which, the upper extremity had been amputated at the shoulder-joint. The wound in the chest soon healed, but the patient remained during life, subject to fits of suffocation and abundant hæmoptysis, under the effects of which he at length sank. On an examination of his body, the ball was found lying behind the third intercostal space in the midst of the pulmonary tissue, but lodged in a kind of cyst which communicated with the bronchi.

I shall reserve for a future part of this volume, certain remarks relative to the period within which, at common law, death must take place from a wound, in order to render the

aggressor amenable for the fatal result. A medical jurist might be inclined to ask,—why, when death is obviously caused by a wound, is it necessary that a wounded party should die within any particular time? It may be answered, that before an indictment for murder or manslaughter can be sustained against a prisoner for fatal wounds inflicted by him, the prosecutor must prove, that the deceased died of these wounds within a year and a day after he received them. It is a principle in our law, the reasonableness and policy of which, in a medical point of view, will be hereafter more fully examined, that should the deceased survive a year and a day and then die, he is not presumed to die of the wounds, but of some other cause.¹

Even where a much shorter period of time is involved, it will be sometimes difficult for a medical witness to satisfy a jury, that a wound proving fatal, was really the cause of death. Let the following case, which was lately tried, serve as an illustration of this.

Richard Mevin was indicted for the manslaughter of a boy.² It appeared that the prisoner and the deceased were employed at a colliery near Whitehaven. On the day on which the blow was given, they were working in the pit together; when, on the deceased making a reply to the prisoner, who had desired him to work harder, the latter threw a stick, which hit the deceased on the head with such force as to knock him down. He did not complain much of the blow at the time, but in about a *week*, the scalp ulcerated at the part where he had been struck, and he soon afterwards died. A medical witness stated that, in his opinion, the wound on the head was clearly the cause of the deceased's death. His lordship charged the jury, who in a few minutes returned a verdict of not guilty.

Mr. Justice Alderson expressed surprise at the verdict, and inquired of the jury, if they could doubt that the boy had died of the wound inflicted by the prisoner. The foreman of the jury said that they acquitted the prisoner *on account*

¹ ARCHBOLD. Pleading and Evidence in Criminal Cases, p. 212, 237. Vide post, Legal Relations of Wounds.

² Northern Spring Circ. 1833: before Mr. Justice Alderson.

of the time that had elapsed after the blow, before the boy's death. The judge observed that a mitigating circumstance of that kind, should not weigh with the jury. It would be advisable for them always to find the simple fact, and leave other considerations in mitigation of punishment to the Bench. In the present instance, had the prisoner been found guilty, the punishment would have been light; and certainly juries should take care, that their verdicts did not hold out encouragement to people to strike blows in fits of passion !

The rebuke from the learned judge in this case, we cannot but consider as having been well merited; for although when doubt exists as to whether death may, or may not, have taken place from a wound, it is legally in the province of a jury to determine; yet when the cause of death is clear, and the depositions of the medical witness are satisfactory, a verdict of this kind is directly opposed to the proper administration of justice. If all juries were guided by the principle urged as a justification in this case, there would be but little need of medical evidence to prove the connection of a wound with the death of a party, in charges of murder and manslaughter: but fortunately, such an occurrence is rare. The precise number of hours, days or weeks, that a wounded man survives, is not commonly considered sufficient to determine whether the death were due to the prisoner's act or not; and where a circumstance of this nature is allowed to influence a verdict, it may be ascribed, as in the above case, to extreme ignorance, or to a positive disbelief of the statements and opinions of the medical witnesses.

The French penal code, which is in some respects admirable, and worthy of imitation for the comprehensiveness and clearness of its provisions relative to wounds unlawfully inflicted, embraces the objectionable principle of regulating the punishment of an aggressor, in certain cases, by the time which a wounded party survives. According to Art. 316 of the Penal code, an individual convicted of the crime of castration, is liable to be condemned to the galleys for life; but if the mutilated party should die from the effects of the injury before the expiration of the *fortieth*

day after its infliction, the offender is subject to capital punishment.'

How the occurrence of death within the specified time can render the crime greater, which we must consider to be the case by capital punishment being attached to it under these circumstances, it would be difficult to explain. The mutilated party may be weak, or have an irritable constitution, and die within the time prescribed; or on the contrary, in another, death may not take place until the fiftieth day, yet if it be clearly a consequence of the wound, the latter offence is not less atrocious than the former; and certainly, morally speaking, there are no grounds to justify a difference of punishment in the two cases. The injustice which must arise from a rigorous adherence to this species of legislation, proves that it is more safe and reasonable to punish a prisoner according to his intent and the actual result of his crime, and not according to the period at which his violence may happen to prove fatal.'

III. *Death may follow a wound, but not be caused by it.* This event is by no means uncommon, and, as in the minds of non-professional persons, death may appear to be a direct result of the injury, the case can only be cleared up by the assistance of a medical practitioner. In several instances of attempted suicide of recent occurrence, such a coincidence has been witnessed. A man has inflicted a severe wound on himself while labouring under disease; or some morbid change, tending to destroy life, has occurred subsequently to the infliction of the wound,—death has followed; but a surgeon, by careful examination of the body, has been able to refer death to the proper cause. The importance of an accurate discrimination in a case where a wound has been inflicted by another, must be obvious on the least reflection; a hasty opinion may involve an accused party in a charge of manslaughter; and, although a barrister might be able to shew on the trial, that death was probably attributable, not to the wound, but to co-existing disease, yet it must be remembered, that the evidence of a surgeon before a coroner, in remote parts of this country, may be

¹ ORFILA. Vol. II. p. 421; also DEVERGIE. Vol. II. p. 2, et seq.

the means of causing the accused to remain incarcerated for a period of five, six, or seven months previous to the trial. This is in itself a punishment, independently of the loss of character and fortune, to which the injured party must be, in the mean time exposed.

In September, 1832, an inquest was held in the neighbourhood of London, on view of the body of a respectable veterinary surgeon. A medical man deposed, that he was called in, to see the deceased, who, he found, had nearly severed his wind-pipe, in an attempt at suicide. The deceased was at the time labouring under delirium from scarlet fever. Death took place the following morning, and on an examination of the body, it was found that but little blood had been lost, and that none of the important vessels of the neck were injured. The Jury, and the friends of the deceased were prepared to hear that his death was caused by the wound, but they were undeceived by the surgeon, who attributed it to the effects of the disease under which he was labouring, adding, that there was every probability that he would have died at the same time, and under the same circumstances, if he had not made the attempt on his life,—a verdict was returned accordingly.

The following is an interesting case of a similar nature. In October, 1833, a gentleman of the name of Tuffnell, attempted to commit suicide, by cutting his throat with a pen-knife. Death took place about three weeks afterwards, and an inquest was held on the body.

It appeared from the evidence given before the coroner, that the mind of the deceased had been very much disturbed by the result of a trial, in which he had been engaged as a witness, and which had been decided only a few days previously. On the day before that on which the suicidal attempt was made, he went to the house of a friend, and was there seen and prescribed for by a medical practitioner. This gentleman stated that he found the deceased extremely agitated, complaining greatly of his head, which he said felt giddy. Cupping was recommended, but the deceased refused to submit to it, proposing to defer it until the following morning. It was on that morning that he made

the attempt on his life. From the evidence of a witness, it appeared that, alarmed by a noise in the deceased's bedroom, he went up, and on entering, discovered him lying on his back, with blood flowing from his neck. The wound it was supposed had been inflicted while he was lying on the bed, for the coverings were bloody, and the pen-knife which he had used, was found near the head of the bed.

The wound was situated on the right side of the neck,—it was four inches in depth, and one inch in length, and involved some of the branches of the subclavian artery. The wound went on favourably, but secondary hæmorrhage occurred twice, in consequence of the deceased having violently torn away the dressings. After lying for about three weeks with a fair prospect of recovery, the deceased suddenly died,—a circumstance which led his medical attendants to conclude that some internal disease must have co-existed, although it was the general opinion that the wound had caused death; and it was under this impression, that a jury was summoned to investigate the particulars.

The body was carefully inspected, and a large abscess occupying one of the hemispheres of the brain, was discovered, with an effusion of water between the membranes. These appearances, coupled with the symptoms immediately preceding death, satisfactorily accounted for the fatal result. The medical witnesses accordingly deposed on the inquest, that death was occasioned by the abscess; and that this had no connection whatever in its origin with the wound. They stated that the abscess had probably been forming before the infliction of the wound, and that the individual must have died, whether the wound had been inflicted or not. Indeed, the loss of blood would, in their opinion, have tended to stay the activity of the disease, and probably to prolong life.

Now, if we suppose that the wound in this case had been inflicted by another, on provocation, and that the examination of the body had fallen under the hands of less careful practitioners, who might have neglected to examine the head, the accused party would have been charged with manslaughter, and sent to trial. Here again the same witnesses being examined, and the prisoner's case remaining undefended,

sufficient evidence might be laid before a jury, to induce them to convict him. No case can more strongly shew the responsibility which may be attached to the duties of a witness. The punishment or acquittal of an innocent person, would depend upon his medical skill; for we cannot suppose, either that a barrister or a coroner, would always succeed in exposing an error of a nature so exclusively professional. This is a case which also teaches us the importance of constantly adhering to a principle of duty, recommended in the first part of the chapter,—namely, to examine the *whole* of the body in suspected death from local injuries.

I shall now lay before the reader, a case which actually came to trial, in which the accused parties were improperly committed for manslaughter, by a coroner, in spite of the medical evidence, and were acquitted on the trial in consequence of it. In May, 1832, two females were charged with the manslaughter of a woman named Chalk. The same evidence was adduced on the inquest as at the trial. The prisoners had been drinking and quarrelling with the deceased on the evening previous to her death, and blows were exchanged. The deceased returned home, was taken violently ill in the course of the night, and expired at seven the next morning. The body was carefully examined by *ten* medical practitioners, some of whom had seen and attended the deceased during her illness. They all deposed that she had died of malignant cholera, and not from the effects of the alleged violence. In opposition to this evidence, the jury, under the instructions of the coroner, returned a verdict of manslaughter; and although the bill when presented, was ignored by the Grand Jury, yet the prosecution was persisted in, solely on the coroner's warrant. After the general evidence had been gone into on the trial, and the medical witnesses had again stated their opinions, the Recorder interfered and recommended that the prosecution should not be persevered in, against the evidence of the medical men. The counsel for the prosecution, however, dissented from this opinion, and was about proceeding to call other witnesses, when the jury returned a verdict of not guilty. The prisoners were immediately discharged.

This case will shew that the assistance of medical men is sometimes necessary upon trials, to obviate the effects of errors committed by parties invested with judicial authority, but whose ignorance of subjects of a professional nature, often incapacitates them for a proper discharge of their duties. A charge of manslaughter cannot be sustained against a prisoner, unless the death be so immediately and obviously occasioned by the violence inflicted by the prisoner, as to exclude all doubt on the subject; and, observes Starkie, "the connection between the act of the prisoner and the death of the deceased, must be proved by means of the judgment of persons of professional skill and experience, who have had an opportunity of forming an opinion upon the subject, or who are enabled to form an opinion from the circumstances of the case, as detailed by others."¹ Here *ten* medical witnesses unanimously deposed that death did not result from violence, but evidently from a disease, the symptoms and progress of which could not be readily mistaken. There was not a single dissentient voice. Nevertheless the prisoner was committed for a crime, to establish which on the trial, the whole of these witnesses must have recanted their opinions, and sworn to the very reverse of their depositions at the inquest! The counsel for the prosecution admitted that the deceased had died of cholera, but he stated that he was prepared to shew the jury, that the violence sustained by the deceased, might have predisposed her to the reception of the disease. Even if the creating of this predisposition, by the prisoners, had been clearly proved against them, which was not probable from the evidence, this would have been a very weak ground, upon which to rest a charge of felonious homicide. The maliciously accelerating of the death of another, already labouring under disease, is criminal; but, admitting the probability of the occurrence, it yet remains to be decided whether the proof of merely creating a predisposition to a disorder which proves fatal, would justify a coroner in committing the accused for manslaughter.²

¹ Vol. II. p. 946.

² Lord Hale in remarking upon the necessity of proving that the act of the prisoner caused the death of the party, says:—"It is necessary that the death should have been occasioned by some corporeal injury done to the

In the same year, another trial of a somewhat similar nature took place at the Old Bailey Sessions.

A man of the name of Sullivan, had been in the habit of ill-treating his wife by beating and kicking her, especially during his fits of intoxication. Two days previously to her death, her husband had been seen by several witnesses to use great violence towards her, and a report had spread in the neighbourhood, as soon as it was known that she was dead, that the prisoner had murdered her. A coroner's inquest was held, and the jury, in opposition to the evidence given by the medical men who inspected the body, returned a verdict of *wilful murder* against the husband. On the trial, after the general evidence had been gone into, the medical witnesses were called. They deposed that the contusions on the person of the deceased, were altogether insufficient to account for her death, and would have been attended with no serious effects in a healthy subject; in their opinion the deceased had died in consequence of extensive organic disease of the abdominal viscera. It was proved that she had been for years a most dissolute and dissipated character. The prisoner was acquitted.

It must not be forgotten by the practitioner, that numerous causes of death may be lurking within the system at the time that a wound is criminally inflicted; and therefore a close attention to the symptoms and post-mortem appearances can alone assist him in the difficult position in which he may be placed, should the accused party be subsequently brought to trial.

party by force, or by poison, or by some *mechanical means*, which occasion death; for although a person may *in foro conscientiæ*, be as guilty of murder by working on the passions or fears of another, and as certainly occasion death by such means, as if he had used a sword or pistol for the purpose, he is not the object of temporal punishment." (I. 427.) These remarks appear to me to be equally applicable to manslaughter, for the difference between this and murder, consists in the proof of pre-existing malice, which is required to establish the latter. A man who causes the death of another, by producing a violent moral impression on his mind, cannot, on the authority of Hale, be guilty of either; and undoubtedly a predisposition to such a disease as cholera, might be more readily created by exciting the fears of a party, than by using violence to the person.

A man may be severely wounded and yet death may take place from the bursting of an aneurism, from apoplexy, from phthisis, or other morbid changes which it is here unnecessary to specify. If the death of the party can be clearly traced to the disease by an experienced surgeon, the prisoner can scarcely be charged with manslaughter; for the medical witness may give his opinion that death must have taken place about the same time, and under the same circumstances, whether the wound had been inflicted or not. On these occasions, however, one of the following questions would probably arise:—Was the death of the party accelerated by the wound, or was the disease under which he was labouring, aggravated by the wound, so as to produce a more speedily fatal termination? The answer to either of these questions must depend on the circumstances of the case, and the witness's ability to draw a proper conclusion from these circumstances. An answer in the negative would exculpate the prisoner, but an answer in the affirmative would criminate him. If the answer expressed a doubt upon the subject, the prisoner, according to the humane principles of our law, would have the benefit of it.

It is possible that a man may receive two wounds on provocation, at different times, and from different individuals, and die after the receipt of the second: in such a case, the course of justice may require that the medical witness should state which wound was the cause of death.¹ Let us take the following illustration:—A man receives, during a quarrel, a gun-shot wound in the shoulder. He is going on well, with a prospect of recovery, when in another quarrel he receives a severe penetrating wound in the chest or abdomen from another person, and after lingering under the effects of these wounds for a longer or shorter period, he dies. If the gun-shot wound were clearly shewn to have been the cause of death, the second prisoner could not be convicted of manslaughter; or if the stab were evidently the cause of death, the first prisoner would be acquitted on a

¹ We have already treated of this question, in relation to cases in which several wounds have been inflicted by the same individual; but here the question relates to wounds inflicted by different persons.

similar charge. It might be possible for the surgeon to decide the question summarily, as where, for instance, death speedily follows the second wound, and, on inspection of the body, the heart or a large vessel is discovered to have been penetrated ; or, on the other hand, extensive sloughing sufficient to account for death, might take place from the gun-shot wound, and on inspection, the stab might be found to be of a slight nature, and not involving any vital parts. In either of these cases, all would depend upon the science and skill of the medical practitioner,—his evidence would be so important, that no correct decision could be come to without it: he is, in fact, called upon to distinguish the guilty from the innocent. On some occasions, death may appear to be equally a consequence of either or both of the wounds ; in which case, probably, both parties would be liable to a charge of manslaughter.

The second wound, which I am here supposing to be the act of another, may be inflicted by the wounded party on himself, in an attempt at suicide,—a very possible occurrence. This fact, however, would produce no other alteration in the case, than that instead of having to decide upon which of two persons the charge of manslaughter ought to fall, the witness would have to determine whether the party had not died from the wound inflicted by himself.

Instead of the case becoming complicated by the infliction of a second wound, poison may be administered or taken, and death occurring insidiously from an unseen and probably unsuspected cause, an error will be still more likely to arise. Dr. Christison has treated of the importance of this subject, and has quoted two cases from Wildberg, to shew the necessity of strict medico-legal investigation : he seems to think that the real nature of these cases would not have been discovered in this country.

Dr. Wildberg relates that he was required to examine the body of a girl, who died while her father was in the act of chastising her severely for stealing, and who was believed by all the witnesses, and by the father himself, to have died of the violence used. On inspecting the body, the marks of many stripes were found on the arms, shoulders, and back,

and under some of the marks, blood was extravasated in considerable quantity; these injuries, though severe, did not appear to the examiner, sufficient to account for death. He, therefore, proceeded to inspect the cavities; and, on opening the stomach, he found it very much inflamed and its internal surface covered with a white powder, which on analysis proved to be arsenic. It subsequently appeared, that on the discovery of the theft by her father, the girl had taken arsenic to avoid the consequences of his anger. It was proved also, that she had vomited during the flogging, and had died in slight convulsions. Wildberg, from the discovery of the arsenic and the knowledge of the symptoms during life, as well as from the insufficiency of the violence to prove fatal, very properly ascribed the death of the girl to poison.¹

The other case occurred at Berlin, in 1783. A woman who lived on bad terms with her husband, went to bed in perfect health, but soon afterwards her mother found her breathing very hard, and on inquiring into the cause, discovered a wound in the left side of the breast. A surgeon was immediately sent for, and the hæmorrhage, which had not been great, was arrested without difficulty, but the woman died towards morning. On opening the chest, the wound was found to have penetrated the pericardium without touching the heart; and although the fifth intercostal artery had been divided, there was scarcely any blood effused into the cavity of the chest. Coupling these circumstances with the trifling hæmorrhage during life, and with the facts that the deceased had vomited, and was much convulsed immediately before death, the reporter of the case satisfied himself that she had not died of the wound; and accordingly the signs of corrosion in the mouth and throat, and of irritation in the stomach, with the subsequent discovery of the remains of some nitric acid in a glass in her room, proved that she had died by poison.²

¹ CHRISTISON on Poisons. p. 48.

² Ibid.

CHAPTER VII.

WOUNDS.

IV. Death may be caused by a slight wound,—slight wounds rendered mortal by infirmity, disease, or the abnormal condition of parts,—responsibility of the aggressor. V. Death may result from neglect or improper treatment by the medical or other attendants,—responsibility of the aggressor. VI. Death may result from the improper conduct of the wounded party,—wounds rendered fatal by imprudence,—neglect to call in medical assistance,—refusal to submit to necessary operations. VII. Death may result from a secondary cause,—wounds rendered fatal by fever, erysipelas, tetanus,—result of a recent trial,—erysipelas occurring in a part remote from the seat of injury,—evidence in Mackenzie's case,—in Captain Moir's case. Death following operations, required for the treatment of wounds,—death from phlebitis after venæsection,—Lawson's case,—remarks on the responsibility of the aggressor. Whether the wound was self inflicted or not,—evidence from its situation,—nature,—extent and direction,—suicidal wounds of the throat,—case of the Earl of Essex,—of Sellis,—remarks on the declaration of Sir E. Home,—evidence on the trial of Macarthy. The direction, important in sword and gun-shot wounds which traverse the body,—evidence on a recent trial at the Kent Assizes.

IV. Death may be caused by a slight wound. A degree of violence which would scarcely affect an adult, may suffice to destroy the life of an infant, or of an infirm old man; and the circumstance of such violence having been but slight, would not avail a prisoner as a ground of defence, provided it were not an unusual consequence that it should produce death in a weak and infirm subject, and the wilfulness of the act were made apparent.

At the Croydon Assizes in 1831, a man of the name of Phillips, was indicted for assaulting and robbing Abraham Hanmer. The prosecutor, who was ninety-five years of age, died previously to the trial, and it was proved in evidence

that the prisoner had beaten him severely on the chest, and had committed other acts of violence on his person. The medical witness who attended the deceased, on being questioned by the judge, was unable to say whether the deceased had died in consequence of the injuries inflicted by the prisoner, or through natural causes. The judge then observed, that the prisoner had had a very narrow escape of his life, for if the surgeon could have sworn that the violence had been the cause of death, although comparatively speaking slight, he would have rendered himself liable to be tried for murder.

A female far advanced in pregnancy, might be destroyed by a blow, which would probably be unattended by any serious consequences if inflicted on another in an unimpregnated state; and here, as Orfila observes, the aggressor ought to be made amenable for the consequences of the violence, however slight, since he could not but be aware of the condition in which the assaulted party was, at the time of the injury.¹

Occasionally, however, circumstances present themselves which ought to mitigate the guilt of a prisoner, since the part of the body sustaining the injury, may have been in an abnormal state, of which the prisoner could not be aware. A case is related by Dr. Paris, which may serve as an illustration of this point. A man caught a boy in the act of robbing an orchard, and struck him a blow on the head with a stick. This caused a fracture of the skull and the boy subsequently died. On the trial it was clearly made out in evidence, that a mere chastisement was intended, for the size of the stick was not such as to have occasioned any serious injury under common circumstances; but, in this case, the skull of the deceased was preternaturally thin.

Many years since, a woman was tried at the Old Bailey, for the murder of her husband, by kicking him in the groin. The surgeon who examined the body of the deceased, stated that there existed an old inguinal hernia at the spot where the violence was inflicted, and that the intestine, contained

¹ Vol. II. p. 525.

within the hernial sac, was very much injured ; a circumstance which, in his opinion, satisfactorily accounted for death. He was then asked whether a similar blow, inflicted upon a healthy individual, would have given rise to fatal consequences. He answered in the negative, and the woman was immediately acquitted on the capital charge.

A gentleman in India, was tried for the murder of his servant, whom he had killed by a blow on the loins. It was proved in evidence, that the kidney of the deceased contained a calculus, the rugged points of which, by puncturing the blood vessels, had occasioned a fatal hæmorrhage. The prisoner was instantly acquitted on the capital charge, the violence having proved accidentally mortal from disease.

In the year 1721, a Dr. Fabricius was tried at the Old Bailey, for the murder of his female servant by striking her behind the ear, owing to which a large abscess situated at the part, became ruptured. The chief question on the trial, was whether the deceased had died from the effects of the violence or of the disease under which she was labouring. It was urged in the prisoner's defence, that he had inflicted the blow simply with the design of opening the abscess. The jury, however, did not agree in taking this scientific view of the injury, and returned a verdict of manslaughter against him.

It must be evident to the surgeon that there exist numerous other internal diseases, such as aneurism, and various morbid affections of the heart and brain, which are liable to be rendered fatal by slight external violence. Now the law, as applied to these cases, is thus stated by Lord Hale :—"It is sufficient to prove that the death of the party was *accelerated* by the malicious act of the prisoner, although the former laboured under a *mortal* disease at the time of the act" (1.428). In those cases, where a slight degree of violence has been followed by fatal consequences, it is for the jury to decide under all the circumstances of the case, upon the actual and specific intention of the prisoner at the time of the act which occasioned death. And, according to Starkie, "it seems that in general, *notwithstanding any facts which tend to excuse or alleviate the act of the prisoner*, if it

be proved that he was actuated by prepense and deliberate malice, and that the particular occasion and circumstances upon which he relies, were sought for and taken advantage of merely with a view to qualify actual malice, in pursuance of a preconceived scheme of destruction, the offence will amount to murder."¹

In all the cases above quoted, there was an absence of intention to destroy life: and in general, the very nature of the wound as well as the means by which it was inflicted, will suffice to develop the intention of the prisoner. An accurate description of the injury, if slight, will often afford strong evidence in favour of the prisoner, since the law does not so much regard the *means* used by him to perpetrate the violence, as the actual intention to kill or to do great bodily harm.²

V. *Death may result from neglect or improper treatment on the part of the medical or other attendants.* There are, it is obvious, many kinds of wounds which, if properly treated in the first instance, may be healed and the patient recover, but when improperly treated, they may prove fatal. In the latter case, it will be a question for the witness to determine, how far the treatment aggravated the effects of the violence, and from his answer to this, the jury may have to decide on the degree of criminality which attaches to a prisoner. Let us suppose, for instance, that an ignorant person has removed a clot of blood, which sealed up the extremity of a vessel, in consequence of which, fatal hæmorrhage has ensued,—or that he has produced death by unnecessarily interfering with a penetrating wound of the thorax or abdomen,—it would scarcely be just, morally speaking, to hold the aggressor responsible, as but for the ignorance and unskilfulness of his attendant, the wounded party might have recovered from the effects of the wound.

In the year 1759, a trial took place at the Old Bailey, which involved this medico-legal question. Richard Lamb was indicted for the murder of William Kendal, by stabbing him in the abdomen. It appeared in evidence, that the

¹ STARKIE, Vol. II. p. 948. ² STARKIE, Vol. II. p. 958.

wound was about an inch in length, that a great portion of the intestines protruded through it, and that in this state the deceased was allowed to remain twelve hours, without having any thing done for him, by those whose duty it was to have attended to him. One medical witness stated in his examination, that he considered the wound to have been the immediate cause of death, and that a fatal result might have been prevented had timely assistance been afforded.¹

Where death is really traceable to the negligence or unskilfulness of the person who is called to attend on a wounded party, this circumstance ought to be admitted in mitigation; and such would probably be the case, supposing that the wound had not been inflicted under circumstances, which, in the opinion of the judge, would make the offence amount to murder. In this case, the responsibility of the prisoner is not made to rest upon the death of the wounded party, for even if the latter should recover from the effects of the wound, he is liable to be tried on a capital charge.

In relation to this medico-legal question, Lord Hale observes: "It is sufficient to constitute murder, that the party dies *of the wound* given by the prisoner, although the wound was not *originally mortal*, but became so in consequence of negligence or unskilful treatment; but it is otherwise where death arises *not from the wound*, but from unskilful applications or operations used for the purpose of curing it." (1.428.) The medical jurist will here perceive that a very nice distinction is drawn by this great judge, between death as it results from a wound rendered mortal by improper treatment, and death as it results from the improper treatment, independently of the wound. In the majority of cases such a distinction could scarcely be established, except upon conjectural grounds, and probably in no case would there be any accordance in the opinions of the medical witnesses. In slight and unimportant wounds; it might not be difficult to distinguish the effects resulting from bad treatment, from those connected with the wound, but, there can be but few cases of *severe* injury to the person, in which a distinction of this nature could be safely made.

VI. *Death may result from the improper conduct of the wounded party, after the receipt of the injury.* A man who has been severely wounded in a quarrel, may obstinately refuse medical assistance, or he may insist upon going a journey, contrary to the advice of his medical attendant, or, by other imprudent practices, may thwart the best conceived plans for his recovery. Let us take a very common case as an illustration. A man receives a blow on the head in a pugilistic combat, from the first effects of which he recovers, but after having received surgical assistance he indulges in excessive drinking, and dies. The aggressor is tried on a charge of manslaughter, and found guilty. Death under these circumstances, is commonly attributed by the medical witness to extravasation of blood on the brain; but a barrister is generally able to draw from the witness, an admission that the excitement produced by intoxicating liquors, would satisfactorily account for the fatal symptoms. In the case which we are here supposing, such an admission might be made, and the prisoner receive the benefit of it consistently with the proper administration of justice; for the imprudence or negligence of a wounded party ought not, morally or legally speaking, to be considered as adding weight to the offence of the aggressor. Of course it is presumed that there should be a fair prospect of recovery, so far as a prognosis could be given, for if the symptoms should be from the first unfavourable, the circumstances could hardly be held out in mitigation. The more clearly the medical witness is able to trace death to imprudence or excess, on the part of the deceased, the more obviously would the moral responsibility of the prisoner be diminished; and hence the necessity of attending to the progress of a wound, which if it prove fatal, may involve another in a charge of manslaughter. We here speak of the *moral* responsibility which attaches to a prisoner so situated,—his legal responsibility is the same, whether the deceased die on the spot, or some days afterwards, unless it can be distinctly proved that his death was immediately connected with the imprudence or excess of which he was guilty and wholly independent of the wound. But, although a prisoner should be found guilty of manslaughter under these circumstances, the punishment attached

to this crime varies in degree, and is so adjusted by our law, as to leave a considerable discretionary power in the hands of the judge. This is, indeed, tantamount to a direct legal provision, comprehending each different shade of guilt;—a man is held responsible for a wound rendered accidentally mortal, by events over which he could have no control, and which in themselves ought to be regarded as in some degree exculpatory; but the punishment attached to his offence will be severe or slight, according to the representation made by the medical witness, of the circumstances which rendered the wound mortal; if he neglect to state the full influence of imprudence or excess on the part of the wounded person, where it has existed, over the progress of the wound, he will probably cause the prisoner to be punished with undue severity. The humanity of our judges is such, that where the medical evidence is clear and consistent on a point of this nature, and there are no circumstances in aggravation, they commonly pass a mild sentence on the prisoner.

A case is related by an American writer, where a man received a blow on the head while in a state of intoxication, he walked and conversed afterwards, still continuing to drink spirits, and died in about thirty-eight hours under symptoms of insensibility, dilated pupils, and oppressed breathing. The witnesses did not refer death to the blow on the head, and the prisoner was acquitted¹

A young man received a sword wound in a duel, which penetrated the thorax about the sixth rib, wounding the diaphragm and substance of the liver, but without injuring the lungs. Blood issued from the wound for the first few days, and vomiting with difficulty of breathing, supervened. These symptoms disappeared and the patient was going on so well, that his medical attendants did not anticipate any dangerous consequences from the wound. The wounded party at this time departed from the prescribed regimen, and imprudently drank a large quantity of malt liquor. He now became worse, and died. On inspecting the body, the injuries above mentioned were discovered, with a slight extravasation

¹ American Medical Recorder. Vol. I.

of blood. The physicians and surgeons who were consulted respecting the cause of death, decided that it arose from the imprudence of the deceased. This opinion was also adopted by the celebrated Hoffman, according to whom, the wounds were neither absolutely nor necessarily mortal.¹

The following case, related by the same writer, displays to us an unnecessary severity of punishment. The prisoner in a quarrel, struck his adversary a blow in the inguinal region. The injured party who was labouring under hernia, complained of slight pain at the time, but was able on the same day to return to his house on foot, which was at three leagues distance from the spot. He continued to work at his ordinary employment, but died about a fortnight after the quarrel. The prisoner was accused of homicide, tried, found guilty, and condemned to five years imprisonment. It does not appear that the body of the deceased was examined, and yet the prisoner was made responsible for his death. It is also not improbable that the imprudence and negligence of the deceased in walking and continuing to work after the injury, may have mainly contributed to render a slight and unimportant wound, fatal.²

It might here be a question whether we are to class among acts of negligence on the part of a wounded person, sufficient to mitigate the offence of a prisoner, the not calling in a medical practitioner, or the refusing to receive medical advice. A wound susceptible of being cured, might thus prove mortal, and the prisoner be charged with manslaughter. I am not aware of any decision upon this point, but doubtless if a verdict of manslaughter were returned in such a case, a judge would inflict a lenient punishment. That the question has received the attention of medical jurists on the

¹ FODERÉ. Vol. III. p. 273.

² The *Lex Aquilia* seems to have been applied by the Romans, to cases of this description, at least in regard to slaves: *Si verberatus fuerit servus, non mortiferè, negligentia autem perierit, de vulnerato actio erit, non de occiso*. According to Foderé, the ancient law of France was equally lenient, for if neglect were proved on the part of the patient, the prisoner was saved from capital punishment, even when the wound was of a dangerous or mortal nature.

continent, is proved by the following case, reported in Foderé's work, as having occurred to M. Biessy, of Lyons.¹

A man received a transverse wound on the forehead, about two inches in extent, involving the integuments and exposing the *os frontis*, but without apparently injuring that bone. The wound appeared to have resulted from a violent blow, by some bluntly cutting instrument. The wounded man remained at home for two days after the injury, without seeming to suffer in his health. At this period he became lethargic, and experienced for eight days violent convulsions. These symptoms ceased for a short time, but they returned, and he died on the forty-seventh day after the receipt of the wound, during the whole of which time he did not call in medical assistance. M. Biessy, who was consulted on the case, considered that the deceased had died from the common consequences of a severe injury to the brain, and inasmuch as the deceased had adopted no means of treatment by which such injuries are commonly prevented from taking a fatal course, he regarded the wound as mortal from the negligence of the wounded party. The prisoner was held responsible for the death of the deceased, but the jury so framed their verdict, that he was sentenced to a slight punishment. This report proves how difficult it is to legislate for cases of this description; since it could not be denied by the reporter, that even if medical assistance had been afforded to the patient, his wound might have terminated fatally, within the same period.

A man may receive a lacerated wound of an extremity, which is followed by tetanus or gangrene, and thus proves fatal;—he may have obstinately refused amputation, although proposed by his medical attendant when first called, but this would scarcely be held as a mitigating circumstance on the part of the prisoner, because the wounded party is not compelled to submit to an operation, and the medical witness could not swear that the operation would have positively saved his life; he can merely affirm that it would have afforded the deceased a chance of recovery. Or again, a person may receive a blow on the head, producing fracture with great depression of bone, and symptoms of compression

¹ FODERÉ. Vol. III. p. 273.

of the brain ;—a surgeon may propose the operation of trephining to elevate the depressed bone, but the friends of the wounded man, will not permit the operation to be performed. In such a case, his line of duty will be to state the facts to the court, and it is probable, that here at least, some mitigation of punishment on conviction, would take place, because such an injury if left to itself, must prove mortal, and no doubt could exist in the mind of any surgeon, as to the absolute necessity for the operation. The question relative to death from a secondary cause in wounds, is too important to be thus dismissed, and as it is very frequently raised in Courts of Law, we shall proceed to treat of it in a separate section.

VII. *Death may result from a secondary cause.* An individual who recovers from the immediate effects of a wound, may die from fever, inflammation or its consequences, erysipelas, tetanus, or gangrene ; or an operation, required during the treatment of his wound, may prove mortal. These are what may be called secondary causes of death, or secondary consequences of the wound. The power of deciding on the responsibility of the prisoner, for an event which depends only in an indirect manner on the injury originally inflicted by him, rests of course with the authorities of the law. But it is impossible that they can decide on so difficult and nice a question, without satisfactory medical evidence ; and on the other hand, it is right that the medical witness should understand the importance of the duty here required of him. Dr. Christison observes in relation to this subject, “ in charges of homicide, although it be proved that the injury inflicted by the prisoner, occasioned death, not directly but indirectly, through the medium of a cause coming into action after the injury, the prisoner will nevertheless be held responsible provided the injury was serious, and it shall appear that the intervention of the secondary cause, though not a common event, lay in the natural course of things. Hence if a person, after receiving a serious injury, should die of hospital gangrene, caught by his repairing to an infirmary where it was prevalent, or of diffuse subcutaneous inflammation, arising in

consequence of there being at the time an epidemic tendency to that affection, or even of tetanus, a disease of the super-vention of which we can neither trace the causes nor calculate the probability ; in all these circumstances," he asks, " would not the person, who inflicted the injury, be held responsible for the event ?" Without attempting to answer these questions, this learned medical jurist remarks, that they are " of great nicety and of difficult determination." There are, moreover, but few cases on record from which we can draw any inference as to the practice of the law. In most instances, the question has been waived, but, notwithstanding this, it is one which I consider to be deserving of discussion in a work on medical jurisprudence. Fever or erysipelas may follow many kinds of serious wounds, and in some few instances be distinctly traceable to them, but in others, the constitution of the patient may be so broken up, by dissipated habits, as to render a wound fatal, which in a healthy subject, might have run through its course mildly, and have healed. Where the fever or erysipelas is readily to be traced to the wound, and there is no other apparent cause of aggravation to which either of these disordered states of the body may be attributed, they can scarcely be regarded by the medical practitioner as very unexpected or very unusual consequences of such injuries, especially when extensive, or when seated in certain parts of the body, as the scalp ; and, therefore, if death should follow, it does not appear unjust, that the prisoner should be as much responsible as if the wound had proved directly mortal. We shall see, hereafter, that this principle has been admitted by our law, with regard to tetanus ; and, indeed, were it not so, many reckless offenders would escape, and many lives would be sacrificed with impunity. It is difficult to lay down a general rule, upon a subject which is liable to vary in its relations in every case ; but where the wound is not serious, and the secondary cause of death is evidently due to constitutional peculiarities, from acquired habits of dissipation, the ends of justice are probably fully

¹ Edinburgh Medical and Surgical Journal. April, 1829.

answered by an acquittal of the prisoner ; in fact, such cases do not often pass beyond a coroner's inquest.

Not very long since, I assisted a friend in the examination of the body of a female, who was supposed to have been murdered by a man with whom she cohabited. We learnt that a few days before her death, the prisoner and the deceased were intoxicated, and were violently quarrelling with each other. In the evening, the deceased went to consult a surgeon in the neighbourhood, respecting her arm, which the latter found to be bruised and much swollen and inflamed. The deceased stated that the bruises on her arm, were occasioned by her having fallen out of bed on the previous night. Some medicines were ordered, and lotions were employed to reduce the inflammation, but this soon became erysipelatous, and involved the whole of the arm from the fingers to the shoulder. The deceased became delirious, and died about forty-eight hours after the quarrel with her husband. The surgeon who attended her, having questioned her further as to the manner in which the injuries were received, she stated some time before her death, but not under circumstances to make her statement available as evidence, that her husband had beaten her with a stick, and had otherwise mal-treated her. This statement was corroborated by the evidence of an apprentice, who had seen the parties during the quarrel. On making a *post-mortem* examination of the body, we found the mark of a severe bruise around the right eye, which must have been inflicted before the occurrence of the fatal quarrel, as the circles of colours peculiar to ecchymosis of long standing, had almost vanished. The mark of a severe contusion was found about the upper and outer part of the left thigh, immediately below the trochanter major. This was evidently recent, for the skin was raised, and the discolouration was uniformly livid. On cutting into it, blood in large quantity was found effused beneath in a liquid state. This contusion had undoubtedly been inflicted during life, for the deceased had not been moved from the bed on which she died ; and the circumstance of the effused blood being perfectly liquid, is an additional proof that we must not always expect to find

the blood coagulated in a vital contusion. The principal seat of injury externally, was the right arm, the whole of which from the hand to the shoulder appeared considerably swollen and discoloured. In many spots, where large vesications had existed, the cuticle was entirely detached. On opening the thorax, adhesions of the right lung, evidently of long standing were discovered; but the structure of these organs, with the exception of their being somewhat gorged with blood, presented no trace of morbid change. The heart was pale, flaccid, and somewhat enlarged, its cavities were slightly distended with blood, but in structure it appeared healthy. In the abdomen, the liver was found to be so enlarged that it extended downwards through the umbilical region, and concealed a large portion of the viscera: in structure, this organ was firm and dense, of a pale nutmeg colour, such as it is commonly seen in the bodies of drunkards. The spleen was small and contracted, and contained much less than its usual quantity of blood. The pancreas and kidneys were in their normal state; the stomach and intestines were likewise healthy,—the stomach contained a small quantity of half digested food. The uterus and its appendages were natural; the bladder was contracted, but otherwise healthy.

The cranium externally presented no marks of violence, nor was there any appearance of effused blood on reflecting the integuments. The dura mater was healthy, but the tunica arachnoides was very opaque in circumscribed patches, over both hemispheres; in some parts it was raised into small bladders, by a quantity of effused serum;—the pia matter was slightly vascular. The medullary matter of the *centrum ovale* presented many red points, shewing increased vascularity of the cerebrum,—the ventricles were somewhat more distended than usual with serum, but no blood was found effused in these cavities.

Upon making an incision into the right arm, a great quantity of serum mixed with blood escaped. The muscles, especially the biceps and the brachialis internus, were much paler in colour than natural, but they presented no marks of laceration. The cellular membrane of the back of the

hand, was distended by a serous fluid. A question was raised before the coroner, as to the origin of the violence, namely, whether it had proceeded from a blow or a fall; but sufficient evidence was adduced to shew, that blows had been struck, although it did not appear that they were of a severe nature. On being asked respecting the cause of death, we stated, that the deceased had died from extensive inflammation of the arm, consequent on the external violence, but aggravated and probably rendered fatal by a bad constitution and dissipated habits. In answer to another question, we stated, that the same degree of violence in a healthy subject, and under common circumstances, would not probably have produced a fatal termination. The jury returned a verdict of "died a natural death," and the prisoner was liberated.

In this case, the secondary cause of death being something unusual as a sequence on blows which were proved not to have been severe, it would have been unjust to have made the husband responsible, and probably if the jury had returned a verdict of manslaughter against him, he would have been acquitted when placed on his trial.

In May, 1835, a trial took place at the Central Criminal Court, involving the question of the responsibility of a prisoner, in death from a secondary cause.

John Robinson was indicted for the manslaughter of Richard Wilson, by kicking him upon the leg and knee. The prisoner, it appeared, was attacked by the deceased, and kicked him in self defence. The evidence in the case was almost exclusively medical. The first witness stated that he was called on the 27th April to see the deceased, about a quarter of an hour after he had received the injury. He found the left knee much swollen, and the inner side of it bruised. The usual remedies to subdue inflammation, were employed, but the deceased imprudently left his bed to call upon him on the 1st of May, four days after the injury; and in consequence of the over-exertion, the inflammation rapidly increased and became *erysipelatous*. This was followed by *delirium tremens*, and the deceased died on the 12th of May, sixteen days from the receipt of the blows. It appeared that after the accident, the prisoner while

walking about, had fallen over a pail, and this had produced another wound on the leg, which was seen and prescribed for by his medical attendants. Sir Charles Bell, who was one of the witnesses, did not see the deceased until two days before his death, and he then found the leg in an erysipelatous state. The wound inflicted on the knee he considered sufficient in certain constitutions, to produce erysipelas. When the constitution is debilitated, a slight injury, in his opinion, would suffice to produce all the symptoms which he had witnessed. The jury, who seemed convinced that the blows had not been struck by the prisoner with a malicious intent, immediately returned a verdict of acquittal.

The mitigating circumstances here were, that the blows had been struck in self-defence, that they were not of a very severe nature, and that their effects were aggravated partly by the bad constitution of the deceased, and partly by his imprudence, in leaving his bed contrary to the advice of his medical attendants.

It is sometimes very difficult to establish the connection of the *erysipelas* with a wound, especially where the disease occurs in a remote part of the body not implicated in the wound. The following case is stated by Mr. Dunlop, to have been tried before the Justiciary Court at Glasgow, during the autumn circuit of 1822.¹

"A man of the name of Pace, gamekeeper to Lord Blantyre, was tried for the murder of a poacher, whom he shot so severely in the left arm, that it was found necessary to amputate it above the elbow. The man died of erysipelas phlegmonoides in the right leg, and the question on the trial was, whether the erysipelas was brought on by the gun-shot wound or not. Upon this question, there was great difference of opinion among the medical witnesses. Mr. John Burns, the most eminent surgeon in Glasgow, gave it as his opinion, that the debility caused by the wound, brought on the disease of which the deceased died. Dr. John Thompson of Edinburgh, thought that the tendency to erysipelas had existed long before he received the wound. It appeared in

¹ BECK'S Med. Jur., p. 340.

evidence, that the deceased had been out for two nights in the exercise of his vocation, and had slept without shelter,—that during this time, he had eaten but little, and above all, that he had a foul ulcer in his leg, the absorption from which in the opinion of some of the witnesses, laid the foundation of the disease before the injury was received. Under all these circumstances,” observes the reporter, “what would have been the best mode of treatment in such a case, supposing the deceased had received no wound at all? Undoubtedly,” he continues, “the very treatment which he did receive in consequence of it;—copious bleeding,—light diet,—and perfect rest: while the counter irritation from the amputation, so far from increasing the inflammation which was going on in the groin, must have acted like a blister or a seton in repressing and counteracting it.” The jury seem to have agreed in this view of the case, for the prisoner was acquitted of the charge.

Taking the circumstances as they are above reported, it certainly would have been difficult to show that the erysipelas was directly connected with the wound, and unless this had been clearly and satisfactorily proved, it would have been unjust to make the prisoner responsible for the fatal consequences. The bad habit of body and the actual existence of disease in the leg, were facts in themselves sufficient to render such an opinion improbable.

In the following case, *tetanus* was the indirect cause of death.¹

In January 1827, Mr. Watson, with two other practitioners, was called to examine the body of a man of the name of Clark, who was suspected to have died from the effects of violence.

The deceased, who was a carter, about twenty-five years of age, went on the morning of the 8th of January, with another man to a house kept by the prisoner, Mackenzie. His companion left him, and shortly after his departure, two women attempted to rob Clark of his purse. The deceased

¹ London Medical and Phys. Journal. Vol. LXVIII. p. 164.

was in the act of snatching it from one of the women, when he was attacked by the prisoner. A fight now took place between Mackenzie and the deceased : the latter was thrown down, kicked by the prisoner on various parts of the body, and was forcibly turned out of the house.

Clark went immediately home, and told his friends that he had been robbed, and nearly murdered. He was confined to bed with the bruises which he had received, but the medical gentleman, who then saw him, did not consider his life in danger. On the 11th, he complained to his friends that he felt a contraction of the mouth, stiffness of the jaws, difficulty of swallowing, and dimness of sight. He could not take food on account of the contraction of his mouth, and difficulty of swallowing. On the 13th he was able to go out for a short time on business, and, on the 15th, necessity made him go to his usual work; but he felt himself so unwell that he was soon obliged to return home. He took a little spoon-meat, but, being unable to open his jaws, he could only get the spoon a short way into his mouth. He was obliged to go out again in the evening, although he was very unwell, and complained that he felt as if he should fall down. On his return home, he went to bed.

On the 16th, his mouth was almost closed: medicines could only be got into it, where a tooth was wanting. He was able to identify Mackenzie as the person who had injured him, and to make a declaration to that effect in the presence of the sheriff. He continued to become worse until the 19th, when he died, eleven days after the receipt of the violence, and eight days after the accession of the tetanic symptoms. On the day subsequent to his death, a careful examination of the body was made.

Externally, there was a small lacerated wound upon the nose, at the lower extremity of the suture, which unites the two nasal bones. There were also marks of contusion upon the right elbow and left hip-joints. On dissection, there were found several small portions of extravasated blood under the integuments of the head, particularly above the right eye. The brain was natural; the vessels filled with

blood; there was some serum in the ventricles and in the spinal sheath. The posterior part of the fauces was of a dark red colour, from congestion of the vessels of the lining membrane. This appearance was distinctly circumscribed, extending around the upper end of the oesophagus, root of the tongue, and posterior part of the nostrils. The membrane lining the air-passages had a similar appearance, and contained a considerable quantity of fluid, tinged with blood and purulent matter. The larynx was open and dilated: there was some congestion of the lungs, but the abdomen was natural.

The report of the examiners was, that the deceased had died of tetanus, and that the appearances, on dissection, were not of themselves sufficient to account for death.

An important question then occurred, whether the *tetanus*, of which Clark died, had been caused by the injuries which he had received, or by imprudent exposure to cold, while suffering under the effects of these injuries, or partly by both of these causes. It will be observed, says the reporter of the case, that the deceased received the injuries on the 8th of January,—that he did not go out until the 13th, while on the 11th he had complained to his friends of the tetanic symptoms. There was, therefore, no exposure to cold, or any other cause, which could have occasioned tetanus between the period at which the injury was received and the time at which the symptoms first appeared. Though tetanus sometimes occurs from injuries in this country, it is by no means common: and it very rarely takes place from exposure to cold. An opinion was therefore given, at the trial of Mackenzie, which took place on the 14th of March, 1827, that Clark's death had been occasioned by tetanus, resulting from the injuries which he had received on the 8th of January. The charge of assault was clearly proved against the prisoner, but the charge of murder was departed from by the public prosecutor, with the approbation of the judges,—because the injuries were not of a mortal nature, and had been inflicted without any intention of committing murder; and likewise because tetanus was not a necessary or usual consequence of such injuries. The jury, therefore, returned

a verdict of culpable homicide, and Mackenzie was sentenced to transportation for fourteen years.

The medical evidence, in this case, seems clearly to have established the connection of the secondary cause of death with the injuries inflicted by the prisoner ; and the chief mitigating circumstance in his favour, appears to have been that it was something unusual for tetanus to supervene on injuries, such as those which the deceased was stated to have received.

A case occurred in England in 1830, in which a prisoner was convicted of murder, death having taken place from *tetanus* following a severe wound.

Captain Moir, a gentleman of fortune, and of the most respectable connections, residing in the county of Essex, was charged with the murder of a fisherman, under the following circumstances.

The deceased had repeatedly trespassed on the grounds of the prisoner, but, notwithstanding the frequent warnings which he had received, he set the prisoner at defiance. On the day laid in the indictment, the prisoner, while riding, met the deceased crossing his grounds, in order to pursue his usual occupation of fishing. An angry altercation took place, and the deceased refused to return : the prisoner, in a high state of irritation, then rode back to his house, which was at some distance from the spot, and, having procured his pistols, rode off after the deceased, and overtook him in the act of continuing the trespass. Words again ensued between them, and the prisoner then fired at the deceased and wounded him severely in the arm. The muscles, vessels, and nerves were extensively lacerated, but so far as I have been enabled to learn the particulars, no question seems to have been raised as to the propriety of immediate amputation. The deceased lingered a short time : tetanus supervened, under which he died. On the trial, the medical evidence went to shew that death was caused by tetanus, brought on by the severe gun-shot wound inflicted by the prisoner. In his defence, it was alleged that he shot the deceased under provocation, and that he had not intended to kill him, for he had purposely aimed at the arm. With

regard to the first point, the judges held that the fact of his returning to his house, to fetch a weapon capable of inflicting a mortal wound, was a proof of deliberate malice; while, with regard to the second point, there could be no extenuation, since a serious wound inflicted on an extremity may destroy life as readily as a wound inflicted on the trunk. The prisoner was found guilty and executed, but his execution was considered by many to be *summum jus*.

In this case, the connection of the secondary cause of death, with the original wound, was so clear, that not a doubt could exist in the minds of the professional witnesses, and the law held the prisoner to be as much responsible for the fatal result, as if he had killed the deceased on the spot.

We now approach a question of still greater magnitude, namely, whether, when death takes place from an *operation*, rendered necessary by the effects of a wound, the prisoner is still responsible.

It must here be presumed, that the operation is imperatively necessary, and that it has been skilfully performed; for these are two conditions, without the existence of which, the question of a responsibility of a prisoner for the fatal consequences, could hardly be entertained. A prudent practitioner would, therefore, never operate under the circumstances here supposed, without requiring the advice and assistance of his brother-practitioners; otherwise, as Dr. Smith observes, a criminal may escape punishment, at the expense of the surgeon's reputation.

There are but few cases on record in which this question has been raised. In May, 1835, an inquest was held before the coroner for Westminster, on the body of an Irishman, who had been severely wounded, in an affray, by a policeman. The deceased, according to the evidence, had received several sabre wounds on his person, and one of a very severe nature, in the neighbourhood of the knee-joint. The deceased lingered five weeks, and was then obliged to have his leg amputated, the operation being performed by Mr. Pettigrew, at the Charing-cross hospital. He sank and died

in a few hours after the operation. The prisoner was committed for manslaughter, but I have not been able to ascertain whether he underwent a trial.

The following case was reported in the *Bulletin Médical de Bordeaux*, for January, 1835 :—

A young female, who was near the full term of pregnancy, while endeavouring to protect her husband during a quarrel, received a gun-shot wound in the lower fifth of the left leg. The skin was perforated for several inches around, and the muscles, with the lower parts of the tibia and fibula, were shattered and comminuted, so as to present a uniform mass of a dark colour, and retaining the charge of the gun, the wound not having traversed the leg. A gun-shot wound, of so severe a nature, necessarily required that amputation of the leg should take place. This operation was accordingly performed at the *Hôtel Dieu* of Bordeaux, on the morning after the patient's admission. During the day reaction took place, and the signs of incipient parturition manifested themselves. The female was safely delivered on the morning succeeding that on which the operation was performed; but the veins of the wounded leg now became inflamed, and this inflammation was followed by *phlebotritis*, under which the unfortunate female rapidly sank.

The reporter of the case observes : " Before any opinion could be given as to the criminality of the party inflicting the wound, an answer was required to the medico-legal question, whether the wound was to be regarded as the cause of death? We did not hesitate to declare," continues he, " that the gun-shot wound was the cause of death, since, in our opinion, the wound itself was of a mortal nature, and would have terminated fatally, had not the operation been performed. Further, if we consider that the operation was imperatively required, and had been performed in a proper manner, we must admit that the accidental consequences, which sometimes render operations fatal in spite of the greatest care and best regulated treatment, arose from the necessity of affording assistance to the wounded party, and of endeavouring to save her life."

In the next case, the responsibility of the prisoner

rested only indirectly on the injury inflicted, and directly on an insignificant surgical operation, required during the treatment of the deceased.

Hugh Macmillan, and his wife, Euphemia Lawson, were tried at Edinburgh, on the 17th of December, 1827, for maiming, disfiguring, and disabling Archibald Campbell, by throwing sulphuric acid over him, on the 17th of the previous October. The indictment contained a separate charge of murder against the prisoners, but for reasons to be mentioned hereafter, this charge was departed from by the public prosecutor.

The facts of the general evidence, by which the crime was brought home to the female prisoner, were the following. The Macmillans, who lived on the same stair with Campbell, had long been on bad terms with him; and, a few days before he met with the accident, the woman was bound over to keep the peace towards him, on account of which both she and her husband had been repeatedly heard to vow vengeance in the most malignant language. The female was proved to have obtained, shortly before the commission of the crime, information on the corrosive properties of sulphuric acid; and, in consequence, hinted that she would, some night, try its effects on Campbell's cloak, after her husband was asleep. Early on the evening of the 17th of October, she was seen to carry out, and return with, a particular jug, which she placed under the bed, cautioning the children not to meddle with it. Towards midnight, Campbell, on his way up stairs, to his lodgings, had approached Macmillan's door, when the door opening a little, he observed a female arm thrust out, holding something white; and, under the impression that some mischief was intended him, he was in the act of turning round to retreat down stairs, when a liquid was thrown over him, which, by the intense burning pain it caused, he at once suspected to be oil of vitriol. The alarm being instantly given, the police, in a few minutes, entered Macmillan's room, where the woman was found dressed, and the husband only dressing himself, as if just raised out of bed. No trace of sulphuric acid could be discovered in the room.

But between the alarm on the stair, and the arrival of the police, a person who lived in the floor under the Macmillans, heard their window open, and something immediately break on the pavement below. Accordingly, in the close, under the window, were found the fragments of a jug, like that which the woman had been seen to carry early in the evening; these fragments had a sour taste, and caused the tongue to smart. A large quantity of sour tasted liquid was also found on the stair and wall, between Macmillan's door and the spot where Campbell stood at the moment of receiving the injury. By a complete chain of circumstances, therefore, though not by any direct proof, the act of throwing the deleterious liquid was traced to Macmillan's wife.

Campbell was, without delay, transported to the infirmary, where he arrived about two in the morning. His state at this time, and the progress of the symptoms until his death, were thus described by Dr. Hunter and Dr. Nesbitt in the report. The skin, on the left side of the face, was partially removed, and the whole presented, at first, a white disorganized appearance. The eyelids of both eyes were much inflamed and swollen, and the left eyeball was also severely involved in the mischief, but the right eyeball was uninjured. The skin of the inside of the lips was also white and swollen, and on the back of the left hand, as well as between the fingers, there were white excoriated streaks. In the course of sixteen hours, the white marks turned brown. The pain of the face and eyes, which was at first excruciating, became easier under the use of suitable applications. But as, at the time of the visit, about twelve hours after the accident, the pain of the left eye extending to the head, evidently threatened a severe ophthalmia, *he was bled from the arm*, and next day the operation was repeated. From these measures he derived great relief. The inflammation and disorganization of the eye, however, went on increasing, and soon ended in the bursting of the cornea, and discharge of the aqueous humour and crystalline lens. Towards the close of the fifth day, namely, on the evening of the 22nd, while apparently doing well, he had a shivering fit, and the

z

next morning complained of acute pain at the bend of the right arm, where he had been bled. Inflammation immediately sprang up around the orifice, general swelling of the arm came on, and progressively increased for the three following days. Severe febrile symptoms ensued, and afterwards also difficult breathing, with other signs of pulmonary inflammation. Under these complicated disorders, he gradually sank and died on the morning of the 30th of October. The report concluded by ascribing his death to inflammation of the arm, and concomitant fever.

The body was examined on the following day, and it was found that the vein, from which he had been bled, was very highly inflamed at the wounded part, in the bend of the arm. From this point the inflammation had extended upwards, to the great veins of the arm and the shoulder, and downwards to the small veins of the fore-arm. These vessels were almost filled with purulent matter, and partly obliterated. The large venous trunks, at the upper part of the chest, were in a healthy state. There was a small quantity of serum within the pericardium, but the heart was sound. The pleura was inflamed, and covered at the back part with the usual product of inflammation. Sero-purulent fluid was contained in both cavities of the pleura. The lungs, when cut into, were found very highly inflamed, and particularly in the upper and lower lobes. These organs were indeed extensively consolidated by serous effusion, red hepatization, and diffuse tubercles, intimately intermingled, the tubercular deposit occupying not less than a third part of the volume of the lungs.

Water was found in considerable quantity on the surface, in the cavities, and at the base of the brain. The organ itself was natural. No other morbid appearance was observed. The examiners gave it as their opinion, that the deceased died of inflammation of the veins of the right arm, and of inflammation of the lungs; the former, in their judgment, caused by the wound of the vein in bleeding.

The husband was acquitted, but the female prisoner was found guilty, and condemned to be executed; as, however,

this was the first condemnation under a new statute, her sentence was afterwards commuted for perpetual banishment.¹

The charge of murder is stated to have been departed from by the Lord Advocate at the commencement of the trial, because, while it was quite certain that the evidence would establish another capital offence, his entering upon this charge would have involved a nice legal question, as to the responsibility of the prisoners.

Dr. Christison seems to consider, that phlebotomy following venæsection, imperatively demanded in the medical treatment of a wounded person, ought to be regarded as natural an event in the sequence of effects, as tetanus itself; and that if there be any difference between them, the latter is, on the whole, the more common. He admits, however, that an operation is required for its development; and some difference of opinion might exist as to the propriety of performing this operation in a particular case, or at least as to its absolute necessity under the circumstances for the preservation of life, to which probably the Court would more particularly look. For, if a wounded party should require to be operated on for an event indirectly connected with the injury inflicted, and the operation were not indispensably necessary to the *preservation of life*, it appears to me, that if death can be traced to the operation, the responsibility of the prisoner for the fatal result, would be thereby in great part removed;—at least that it would not be so great as where tetanus supervenes, in the ordinary course of things, as an immediate consequence of a wound, or where it follows an operation absolutely required for the removal of the wounded part, and without which the patient must of necessity perish.

Are we then to consider it as consistent with the ends of justice that a prisoner should be made responsible for death, when this is a consequence of an operation *indispensably necessary* and *skilfully performed*? If this question could be at once answered in the affirmative, we might be quite sure

¹ Copy of Dr. CHRISTISON's Report. Edinburgh Med. and Surg. Jour. April, 1829.

that barristers would still have an ample field left open to them in defending such cases, by calling in question the *necessity* for the operation, and the *skill* with which it was performed. According to Lord Hale, if death takes place from an unskilful operation, performed for the cure of a wound, and not *from the wound*, the responsibility of the prisoner ceases; but this eminent lawyer does not appear to have contemplated, that death might take place as a consequence of the most *skilful* operation required for the treatment of a wound, and yet be wholly independent of the wound itself. A wounded person may sink from the mere shock of an operation, or he may die from the quantity of blood unavoidably lost during its performance. On the other hand, he will apparently be going on favourably, when secondary hæmorrhage may take place, and suddenly destroy him.

The operation may also take an unfavourable turn in its results, if the individual be at the time the subject of internal organic disease, in which case, it seems to me, that the responsibility of the prisoner ought to be considerably diminished. Mr. Travers observes, that,—“A pre-existing disease of the liver, kidney, or testicle, though chronic, and in itself not alarming to the constitution, becomes a drag upon its elasticity, and stands in the way of recovery. Inspection of the body after death, frequently explains the unfavourable result of operations, that promised well, by discovering one or more organs in a state of chronic disease, which had not previously deranged the health in a degree sufficient to give notice of its existence; and which might, therefore, have remained quiet for years to come, had no extraordinary call been made upon the powers of the system.”¹

Should an operation be unnecessarily and unskilfully performed, the responsibility of the prisoner would of course cease, if the death of the wounded party could be clearly ascribed to it. On the whole, this question of the responsi-

¹ For a description of the influence of these accidental circumstances in destroying life after operations, vide TRAVERS on Constitutional Irritation, p. 45, 121, et seq.

bility of an aggressor in death from a secondary cause, may be considered as in a very unsettled state. There seems to have been hitherto a disposition to evade it on the part of the prosecution, whenever a case has occurred in which it was likely to arise; and it has only been admitted and decided on in those instances where the secondary cause was obviously a direct result of the wound.

Having then treated of all those circumstances by which wounds are rendered either directly or indirectly mortal,—and which it is absolutely necessary that the medical jurist should take into consideration when he endeavours to determine for judicial purposes, whether a particular wound has or has not caused the death of a party,—we are now prepared to examine another important medico-legal question, an answer to which is often necessary to attach criminality to an accused party, or to remove suspicion from one who is really innocent of the imputed crime.

An individual is found dead with a severe and apparently mortal wound on his person,—the examiner has satisfied himself that the wound was inflicted *during life*,—also that it was sufficient to *cause death*; but he may be further required to state—

Whether the wound was self-inflicted, or inflicted by another; in other words, whether the death of the party is to be attributed to an act of suicide or murder. It might at first sight be considered, that the determination of a question of this nature, was wholly out of the province of the medical jurist. In some instances it may be so, and the settlement of it is then properly left to the legal authorities; but in a very large number of cases, it is so closely dependant for its elucidation on medical facts and opinions, that juries could never arrive at a satisfactory decision, without his assistance.

Let us suppose then, that a medical jurist is consulted in a doubtful case,—What are the points to which he must direct his attention? These are, with regard to the wound, its situation, its nature and extent, and its direction.

I. The *situation* of the wound. It is a general principle

to which most medical jurists seem to agree, that wounds, inflicted by a suicide, are usually confined to the anterior or lateral part of the body. The throat and the chest are most commonly selected where cutting instruments are employed, while the chest, especially in the region of the heart, the mouth, the orbit and the temples, are the spots generally chosen for the perpetration of suicide by fire arms. But it is obvious, that any of these parts may be also selected by a murderer, with the especial design of simulating a suicidal attempt; therefore, the mere situation of the wound, does not suffice to establish the fact of suicide. Dr. Smith considers, that if the weapon has been introduced into the deceased's mouth and there discharged, we may almost take it for granted, that "it has not been done by another;"¹ but this inference is rather too hastily drawn; because it is quite within the range of possibility, that a cool and calculating assassin, may purposely resort to this method of destroying his victim, in order to conceal his crime. In suicidal wounds from fire arms, a discolouration of the fingers of the hand which discharged the weapon, is sometimes observed; this has also been looked upon as a source of evidence of suicide under doubtful circumstances, but the same objection exists to its admission. Some have regarded it as fully established in legal medicine, that when wounds exist at the posterior part of the body, it is a positive proof that they have not been self-inflicted. The situation is certainly such that we may consider it difficult for the suicide to attain; but, as Orfila observes, it is not the situation, so much as the direction of the wound, which here furnishes evidence against the presumption of suicide. A gun-shot wound, traversing the body from behind to before in a direct line, or a sword wound taking the same course, is not very likely to have resulted from a suicidal attempt; at least it must be obvious that it would require more preparation and contrivance on the part of the self-murderer, so to arrange matters, that such a wound should be produced, than we can conceive him to possess at the moment of attempting his life. Besides, his object is to destroy himself as quickly

¹ For. Med. p. 302.

and as surely as circumstances will admit of ; he is, therefore, not likely to adopt complicated and uncertain means for carrying this design into execution. Nevertheless, we must not always expect to find suicidal wounds in, what a surgeon would pronounce to be, the most proper situation to produce instant destruction. A want of knowledge, or a want of resolution on the part of the suicide, or the accidental slipping of the hand, will often cause a wound in a part where we might not expect to find it. Orfila has related the following case, which shews that gun-shot wounds, produced by suicides, may be found in unexpected situations.

A gentleman of about forty-five years of age, after having passed a very active youth, and accumulated a large fortune, in consequence of want of employment, gradually fell into a state of maniacal hypochondria, which manifested itself by fits. While labouring under these, he had several times shewn a disposition to destroy himself. One day he shut himself up in his room, and a short time after, the report of a pistol was heard. On forcing their way into the apartment, the attendants found him stretched on the floor bathed in blood, but still manifesting some signs of life. A chair and a pistol, recently discharged, were near him. A surgeon was sent for, and then it was found that the skull was perforated and much lacerated *behind and a little above the right mastoid process*. The edges of the wound were formed of the ecchymosed and lacerated integuments,—a large portion of the occipital bone, which was much comminuted, had been forced to the bottom of it, and dark venous blood escaped from it in abundance. The wound was directed from behind forwards, from without to within, and from right to left. Death very soon took place. On examining the body, it was found that the right lateral sinus had been completely torn through,—the right hemisphere of the brain was shattered, and the ball, which was of large size, firmly wedged in the petrous portion of the left temporal bone. The situation and direction of the wound, led the examiners to think that the deceased must have turned his head considerably to the left side, when he placed the mouth of the

pistol against the occipital bone. On putting the pistol in the right hand of the deceased, and turning the arm to the wounded part, it was rendered at once evident, that the wound must have been inflicted while he was in this position. In the room was found a paper in which he had declared his fatal resolution.¹

II. *Nature and extent of the wound.* Generally speaking, the wound met with on the body of a suicide, where fire-arms have not been used, is incised or punctured. Contused wounds are rarely seen in case of suicide, because in employing them there is not that certainty of destroying life which the self-murderer commonly looks to. There are, of course, exceptions to this remark, as where, for instance, a man precipitates himself from any considerable height, and becomes wounded in the fall. Circumstantial evidence—will, however, rarely fail to clear up a case of this description. Greater difficulty may exist where life is destroyed by a contused wound, voluntarily inflicted. A case is related by a German author, in which a man first attempted to destroy himself by running with his head against a wall; and not having succeeded in this attempt, he struck himself repeatedly on the forehead with a cleaver. By this, he produced such violent injury to the brain, that death soon followed. The man was seen to commit the crime by several witnesses; had this not been the case, the nature of the wound was such as must have excited a suspicion that it had been inflicted by another, and that the man had been murdered.

A close attention to wounds, made by cutting instruments, will sometimes lead to the development of cases, rendered doubtful from the circumstances under which the dead body of a wounded person is found. A few months since, the body of a respectable farmer was found lying on the high road, in one of our midland counties. The throat was severely cut, and he had evidently died from the considerable hæmorrhage which had taken place. A bloody knife was discovered at some distance from the body, and this, together

¹ ORFILA. Vol. II. 543.

with the circumstance of the pockets of the deceased having been rifled, led to a suspicion of murder. The suspicion was confirmed when the wound in the throat was examined by a surgeon. It was cut, not as is usual in suicides, by carrying the cutting instrument from before backwards, but as the throats of sheep are cut, when slaughtered by a butcher. The knife had been passed in deeply under and below the ear, and had been brought out by a semicircular sweep in front, all the great vessels of the neck, with the œsophagus and trachea, having been divided from behind forwards. The nature of this wound rendered it at once improbable that it could have been self-inflicted; and it further served to detect the murderer, who was soon afterwards discovered. The prisoner, who was proved to have been a butcher, was subsequently tried and executed for the crime.

The nature of the injury must, in some instances, remove all suspicion of suicide. If a dead body is found with the head separated from the trunk, or the trunk separated in two parts, and the wounds are proved to have been made during life, there cannot be a doubt of the act having been homicidal. These are wounds which *ex naturâ rei* at once remove all suspicion of suicide.

In the year 1828, M. Ouvrard was required to report on the cause of death in a man whose body was found divided in two parts, and floating in the river Loire. The violence on the upper part of his person, in the opinion of the examiner, had been inflicted during life. The separation of the trunk had been effected by dexterously passing a knife into the fibro-cartilage; uniting the third to the fourth lumbar vertebra. The articulatory processes of the vertebræ had been cut transversely through, just as butchers are accustomed to cut through the spines of animals. This fact led M. Ouvrard to suspect that the man who had committed the murder was a butcher; the suspicion was subsequently confirmed by the discovery that Simoine, a butcher of St. Clément des Levées, was the murderer. This man was tried and condemned to death for the crime.¹

¹ ORFILA. Traité des Exhumations. Vol. II. p. 336.

It is necessary to bear in mind, that maniacs, when they commit suicide, often inflict upon themselves wounds of a very extraordinary nature, such as would, at first view, lead to a suspicion that they had been inflicted by the hand of a murderer. Foderé mentions, that a lunatic, of the village of Lonslebourg, on two different occasions, stabbed himself in the abdomen, and was caught in the act of unravelling the intestines, which had protruded through the wound.¹ Such an injury, when discovered in a dead body, might give rise to a suspicion of homicide; and, therefore, the rules which are here laid down to distinguish homicidal from suicidal wounds, must be very guardedly applied to the cases of those individuals who are known to have laboured under insanity.

The *extent* of a wound has been mentioned among the circumstances, which may serve to distinguish homicide from suicide. It was formerly supposed that a very extensive wound of the throat, involving the great vessels of the neck, on both sides, with the trachea and all the intermediate organs to the vertebral column, could not be inflicted by an individual on himself. Such a wound, therefore, existing on a dead body, was considered to afford presumptive proof of homicide. The case of the Earl of Essex, who was found dead in the Tower, on the 13th of July, 1683, may here serve as an illustration. The Earl was imprisoned on a charge of high treason, but he had only remained in prison three days, when he was found dead, with his throat severely cut. Many reports were circulated, to the effect that the Earl had been murdered, and it was openly declared by one individual, that persons had been hired to murder the deceased by the Duke of York, afterwards King James II. The surgeons, who examined the body, stated that the jugular vessels, with the trachea and œsophagus, were cut through to the very neck bone. Some suspicious circumstances occurred at the holding of the inquest. The body, it is said, was removed from its position, and the jury were not allowed to examine the clothes worn by the deceased.

¹ Vol. III. p. 183.

The verdict returned was to the effect that the Earl had committed suicide.

The strong political feeling which existed against the supposed author of the murder, caused the matter to be again taken up after the Revolution of 1688, and in a publication, which then appeared, the following statements were made. The razor with which the wound was inflicted, was found on the left side of the body, while it was well known that the Earl was right-handed. It had no handle, and it was therefore considered impossible that the deceased could have made with it so large and so deep a wound in his throat. The edge of the razor was notched, and, when an explanation of this fact was asked of one of the surgeons, at the inquest, he is stated to have suggested that the notches had been produced by the deceased drawing the razor against his neck-bone, although the witness seems to have forgotten that the carotid arteries, and the jugular veins, must have been divided, before the neck-bone could be reached! As more important circumstances, we find it mentioned, that the cravat worn by the deceased was cut through, and that his right hand was cut in five places. Such were the allegations made; and, if true, they certainly went strongly to establish the presumption of homicide,—more strongly, indeed, than the extent of the wound, and the number of parts involved. In relation to this latter question, several surgeons and physicians were summoned before a committee of the House of Lords, and were required to state to their lordships, whether it was possible that so extensive a wound could have been self-inflicted. They admitted its possibility, but they declared their belief, “that when any man had cut through one of his jugular veins, and the gullet and windpipe to the very neck-bone, nature would be thereby so much weakened, by the great effusion of blood and animal spirits, that the *felo de se* would not have strength sufficient to cut through and behind the other jugular, as, my lord’s throat, by surgeons who saw it, was said to be cut.”¹ It must be

¹ Hargrave’s State Trials.

remembered, however, in opposition to this opinion of the witnesses, that there are not many suicides, who, in cutting their throats, carry the instrument on one side, "to the very neck bone;" and also that the instrument may be, and often is, carried at one sweep, from before backwards, so as to divide the great vessels on both sides at the same instant.

When a question of this nature is mixed up with political feeling, it is very difficult to separate truth from falsehood. There is great reason to believe that in this case, a vast deal more was alleged than proved; and, although there were many apparently suspicious circumstances left unexplained, yet the whole of the facts, upon which reliance may be placed, appear to me reconcileable with the presumption that the earl committed suicide.

It can no longer be denied that a suicide is capable of producing a wound on his throat, so extensive as to involve all the great vessels of the neck with the trachea and œsophagus. This was observed in the case of the late Mr. Calcraft, who committed suicide but a few years since. The unfortunate gentleman was found in his apartments lying in a pool of blood, with a razor firmly grasped in his right hand. The surgeon, who examined the body, deposed that the soft parts of the throat were completely cut through to the vertebral column, and that all the large vessels in the neck were divided. The extensive nature of the wound excited surprise in the minds of the jury, and the medical witness was asked, whether it was not something extraordinary that a man should have the power of producing so severe an injury on his person. Such a question is often raised at a coroner's inquest,—a fact which serves to shew that there is a prejudice deeply rooted in the minds of many men on this subject, and which sufficiently accounts for the reports of murder that are often circulated, where a person is found with the throat so cut, and the slightest ground for suspicion exists against a party, who may have had access to the deceased.

In a late memorable case, some stress was laid by the medical examiner on the fact of the wound being *regular*, as a proof of suicide. I allude to the case of Sellis, a servant

in the household of the Duke of Cumberland, who was found lying dead, with his throat cut, in his bed room at the palace of St. James's, on the morning of the 1st of June, 1810.

A full exposition of the circumstances attending the death of this man, has been recently made in the Court of King's Bench, on the occasion of a criminal information laid by His Royal Highness against an individual for the publication of a libel. The most material witnesses were here examined, and it is from the report of their evidence that I have selected the following particulars.¹

His Royal Highness the Duke of Cumberland stated, that while sleeping in his apartments on the 31st of May 1810, he was awakened about three o'clock in the morning by a blow on the head. Several blows followed, and one produced a very violent incision on the right side of the head, which caused an immense effusion of blood. In endeavouring to defend himself, his thumb received a wound. He jumped out of bed, and made his way, as well as he could in the dark, to his servant's room, when he was again attacked by his assailant, who pursued him, and who doubtless would have murdered him, had not the doors protected his person from some of the blows.

There was no doubt that the man who attacked the Duke, was his servant Sellis, and, it was presumed, that he had committed suicide to avoid the punishment due to his crime.

Several witnesses, who went to Sellis's room, stated, that they found the deceased lying on the bed with his throat cut, and his head nearly severed from the body. The Duke was severely wounded in the temple, and required for some time after the event, close surgical attention. The coroner, who summoned the jury, deposed that a very full and complete investigation was made into all the circumstances,—that seventeen witnesses were examined,—all, whose evidence was material to the case, and that the jury, who had minutely inspected Sellis's room, and the adjoining apartments, after having heard the report of the medical men, returned a verdict of *felo de se* on Sellis. The foreman of the jury corro-

¹ The King v. Phillips, tried in the Court of King's Bench, June 25, 1833.

borated the evidence of the coroner, and stated that there was only one wound in the body, which was in the neck,—that the razor with which that wound was inflicted, was lying on the left side of the bed, and the deceased was proved to have been a left-handed man.

From the general and circumstantial evidence, there does not appear to be any reason to doubt, that the wound on Sellis's throat, was inflicted by himself. The fact of his head being nearly severed from his body, affords no proof of the contrary;—the existence of such a wound, as was just now observed, is not of itself sufficient to justify the slightest suspicion of homicide, and hence this furnishes no ground whatever for the very exaggerated and calumnious statements which have been circulated. I cannot, however, pass over the declaration published by Sir E. Home on the subject. This involves several points of a medico-legal nature, which require examination, the more especially since Sir Everard was one who occupied a high rank as a surgeon, and whose opinions were therefore likely to have considerable weight in, as well as out of the profession. Sir Everard says, "Much pains having been taken to involve in mystery, the death of Sellis, the late servant of His Royal Highness the Duke of Cumberland, I feel it a public duty to record the circumstances respecting it, that came within my own observation. I visited the Duke of Cumberland upon his being wounded, and found my way from the great hall to his apartment, by the traces of blood which were left on the passages and staircase. I found him upon the bed still bleeding, his shirt deluged with blood, and the coloured drapery above the pillow sprinkled with blood from a wounded artery, which puts on an appearance that cannot be mistaken by those who have seen it. *This could not have happened, had not the head been lying on the pillow, when it was wounded.* The night-riband, which was wadded, the cap, scalp, and skull, were obliquely divided, so that the pulsation of the arteries of the brain was distinguishable. While dressing this and the other wounds, report was brought that Sellis was wounded, if not murdered. His Royal Highness desired me to go to him, as I had declared His Royal Highness out of

immediate danger. A second report came that Sellis was dead. I went to his apartment, and found the body lying on his side on the bed, without his coat and neckcloth, the throat cut so effectually, that he could not have survived above a minute or two. The length and direction of the wound were such, as left no doubt of its being given by his own hand: *any struggle would have made it irregular*. He had not even changed his position,—his hands lay as they do in a person who has fainted; his coat hung upon a chair out of reach of blood from the bed,—the sleeve, from the shoulder to the wrist, was sprinkled with blood, quite dry, *evidently from a wounded artery*, and from such kind of sprinkling, the arm of the assassin of the Duke of Cumberland could not escape.

“On returning to the Duke, I found that the doors of all the state apartments had marks of bloody fingers on them. The Duke of Cumberland, after being wounded, could not have gone any where but to the outer doors and back again, since the traces of blood were confined to the passages from one to the other.”

That Sellis inflicted the wound on himself is, I think, sufficiently established by the evidence. There are no grounds for impeaching the veracity of the statements made by the witnesses,—and these are sufficiently corroborated by the circumstances with which the jury, in their verdict, expressed themselves perfectly satisfied. There is, however, in my opinion, much injudicious zeal displayed in the medical report; and it presumes to decide upon a great deal more than the principles of legal medicine can safely warrant. Whether Sir Everard was able to distinguish venous from arterial blood on a coat sleeve, after having been so long exposed as to become quite dry, is a point which I shall not examine; but it appears to me to be a very bold assertion, and one which a witness might well hesitate to make, if his evidence were likely to be exposed to a severe cross-examination. Nor shall I notice the statement which is therein made, that the coloured drapery above the Duke's pillow, could not have become sprinkled with blood from a wounded artery, unless the head was lying on the pillow, when the wound was

received,—further than to remark, that the inference appears to me altogether unwarrantable. The drapery might have become sprinkled with blood, if the head had been placed on the pillow *after* the receipt of such a wound, as readily as if it had been lying on the pillow when the wound was received.

The part of the report which more especially calls for attention, is that wherein Sir Everard states, that the *length* and *direction* of the wound were such as *left no doubt* of its having been suicidal. It would be well if the medical jurist could determine these doubtful questions relative to homicide or suicide by so simple a test. Let the length and direction of such a wound in the throat be what they may, they can never afford more than a very slight presumption of its origin : and it is difficult to conceive of any case in which they would suffice to remove all doubt ; for it is common, in suicides of this description, to meet with every variety in the length and direction of the wounds. But we find it added, that any struggle would have made the wound *irregular* ; a statement which leads of course to the implication that regularity in such a wound, is sufficient to remove a suspicion of homicide ; and, it is a singular illustration, of the influence of this opinion, that the able counsel who supported the criminal information, on the part of the Duke, in the trial above alluded to, should have repeatedly dwelt on this statement, which, medico-legally speaking, appears to be the weakest portion of Sir Everard's declaration. Regularity in a fatal incised wound of the throat is far from being universally seen, in cases of suicide : where there is considerable resolution and firmness of purpose, the wound may be regular ; but there are many whose hands tremble, and who, probably from the flow of blood, lose the power of holding the instrument firmly, before the incision through the soft parts can be completed ; in such, the wound, must necessarily be irregular. Is it not possible, moreover, that a regular wound of the throat may be inflicted by a murderer ? And is it necessary that, in all cases of murder, the victim should struggle while a mortal wound is being inflicted ?

The attempt to maintain either of these positions would be equal to opposing what the most common observation will

establish; and I cannot, therefore, agree in the commendatory view of Dr. Smith, that Sir Everard Home's declaration "furnishes an admirable lesson on the importance of medical investigation in cases of doubt or difficulty."¹ If medical reports are to contain such sweeping inferences from such feeble data, they will certainly rather embarrass, than assist the course of justice.

III. The *direction* of the wound. The direction of a wound has been considered, by some, to afford presumptive evidence, sufficiently strong to guide the medical jurist in his inquiry. Foderé,² and Orfila,³ attach importance to the fact, that, in suicidal wounds which are incised, the direction is commonly from left to right, either transversely or 'passing obliquely from above downwards: in stabs and punctured wounds, the direction is commonly from right to left, and from above downwards. In left-handed persons, the direction of a wound would, of course, be precisely the reverse. Suicidal wounds are, however, subject to such variation in extent and direction, that it is scarcely possible to generalize with respect to them. Nevertheless, an attention to these minutiae, may sometimes be of real assistance to the inquirer, especially where the body has not been moved from its position. It is recommended that the instrument with which the wound has been inflicted, should be placed in either hand of the deceased, and the extremity moved towards the wounded part, so that it may be clearly seen whether or not, the direction of the wound could correspond to it in any position. It might happen that neither arm would reach the wounded part, so as to inflict a wound of the particular direction observed; this may be the case in wounds situated on the back, relative to which some remarks have already been made.

According to Foderé, we may make use of the *direction* of a fatal wound for our guidance, under the following circumstances. The murderer may assert that his adversary threw himself upon the weapon:—here the fact will be explained, if the parties be of different stature, and the taller has been

¹ For. Med. p. 306. Vol. III. p. 187. ³ Vol. II. p. 546.

² A

the murderer, by noting that the stab passes from above downwards; while, if the short person had stabbed the taller, the wound would take a direction from below upwards. The following case is given by him as an illustration: "Two men, of different stature, fought a duel at Marseilles. The swords of the two combatants produced a fatal wound of the chest, at the same moment in each, and both fell dead on the spot. It was remarked that the wound, inflicted by the shorter combatant, was from below upwards; while that produced by the sword of his adversary, passed in a direction from above downwards."¹

Such differences in wounds, depending upon the stature of the persons inflicting them, must be so purely accidental, as scarcely to require notice: but it is right that the medical jurist should lose sight of no circumstance, however trivial it may appear, which is capable of affording him the least assistance in forming his opinion. When the aggressor is considerably taller than his victim, as where a wound has been inflicted by a man on a boy, then its direction may afford evidence, which it would be wrong to reject. Nevertheless, to show the uncertainty attendant on these inquiries, I shall relate the following case, which was tried at the County Cork Criminal Court, in April, 1835.

John Macarthy was indicted for the murder of Daniel Mackenzie, a boy of about fourteen years of age. The deceased was an apprentice to the prisoner, who was a private soldier in the 94th regiment. From the evidence of the father and another witness, it appeared that the prisoner persuaded the deceased to purloin some cloth, a watch, and other things, from his father's house at Fermoy, and to leave the place with him. The prisoner and the deceased were traced on their journey as far as Gurteen Wood, near Ballyhooly, where the dead body of the boy was afterwards discovered, without a coat, cap, or any of the articles which had been taken from his father's house. These articles were subsequently found in the possession of different persons, with whom they had been pawned by the prisoner.

Patrick Connors stated that he lived at Ballymacallon,

¹ FODERÉ. Vol. III. p. 196.

half a mile from Gurteen Wood; he remembered the prisoner and the deceased coming to his house to breakfast, on the day on which the murder was alleged to have been committed. He observed the deceased take the bayonet out of the scabbard, at which the prisoner appeared much displeased, and took it from him. The prisoner, in a conversation with the police-constable, declared, that after having entered the wood, with the boy, he went over a ditch, and the boy followed him. The deceased then drew the bayonet out of the scabbard, which was lying on the ground, and *either forced it into his body or fell upon it*; and that he, the prisoner, then drew the bayonet out of the body, and continued his journey. When asked why he took the deceased's coat, cap, and money, he answered, "that it was better to do that, than to leave them there for any one else."

The medical witness, who examined the body of the deceased, deposed, that he found a triangular wound on the abdomen, *extending upwards and inwards into the chest*, and wounding the heart. The bayonet had penetrated the abdominal cavity on the left side, about three inches from the navel. The wound was the cause of death, and, in witness's opinion, *the deceased could not have inflicted the wound on himself*. In his cross-examination, however, he admitted that *if the deceased had thrown himself on the bayonet, he might have inflicted such a wound*. The prisoner offered no defence, and he was condemned and executed.

In this case, there can hardly be a doubt that the prisoner inflicted the wound on the deceased, notwithstanding its somewhat unusual direction for a homicidal wound. To account for it, we may imagine that the deceased was lying on the ground, or in the act of falling, when wounded. The whole conduct of the prisoner was that of a guilty man; but if we suppose that he had borne a good character previously,—that he could have had no object in the killing of the deceased,—in short, that there had been nothing against him but the bare fact that the boy was last seen alive in his company, and was afterwards found dead,—the direction of the wound would have gone very far to render the man's

explanation probable ; since it was admitted by the medical witness that such a wound might have been received, if the boy had accidentally fallen, or voluntarily thrown himself, upon the weapon.

In the following case, also, a question arose respecting the homicidal or suicidal nature of a wound.

Henry John Honey was indicted for the murder of his wife.¹ According to the evidence, the prisoner, who resided at Plymouth, was an idle, drunken, dissolute character, and lived on very bad terms with his wife. On the morning of the alleged murder, it was proved that they had had a violent quarrel, but about noon they were in their bed-room together, and no noise or quarrelling was heard. The prisoner, it was supposed, had gone up to dress, and his wife had followed him, after having been repeatedly called by him. Five or six minutes passed in perfect silence, when a violent scream was heard,—and the deceased immediately afterwards ran down stairs, bleeding profusely ; she ran into the street, followed by the prisoner, whose shirt-sleeves were covered with blood, and, after staggering a few yards, fell into the arms of her mother. The prisoner, who appeared wild and anxious, exclaimed, “ Oh God ! *she has cut her throat.*” He was at this time in great agony of mind, beating his breast, and crying out that he hoped her life would be saved. •

The medical evidence on the trial was as follows. The witness stated, that when called in to see the deceased, he found her with a transverse wound in her throat ; the blood was flowing copiously, and by pulsations, mixed with air. Death speedily took place, from hæmorrhage and suffocation. A large vessel, connecting the internal with the external jugular vein, was divided.² By closing the wound, and preventing the escape of blood, the deceased revived a little, and spoke. She spoke four or five times within the space of about two minutes, and died in about five to ten minutes after speaking. The witness said he had not told

¹ Western Aut. Circuit, Exeter, Aug. 1835, before Mr. Justice Coleridge.

² It is not stated in the report of the evidence, which I have by me, what artery was divided.

the deceased that she was in danger, but she might have inferred from his manner that he thought her so. He was then about to state the expressions which she had used the few minutes before her death, but the judge decided that they could not be received in evidence, as they did not appear to have been uttered under the assurance of immediate death. An attempt was made by the counsel, who cross-examined the witness, to obtain an admission from him, that the wound on the throat, might have been self-inflicted: and the witness allowed that the direction of the wound was *from the left hand to the right*, the way in which a right-handed person would cut his own throat.

The prisoner put in a written defence, which contained a declaration of the affection that he felt for his wife. The jury returned a verdict of manslaughter, and he was sentenced to be transported for life.

Here the fact of the prisoner having made the wound in the throat, could not be proved against him. Its situation, and direction, were such, that it might have been produced by the deceased on herself; but the general evidence strongly showed the guilt of the prisoner, and, in his defence, he did not attempt to deny that he had inflicted the wound. One circumstance which went much against him, was, that he tried to poison himself immediately after the occurrence.

A case, of an interesting nature, occurred in London, in April, 1835. The circumstances were somewhat similar to those of Honey's case, but the verdict of the jury, at the inquest, left the question of homicide or suicide undetermined.

A woman was reported to have been murdered by her husband. The accused and his wife had, for some time, been on bad terms, and the neighbours had frequently interfered to prevent them from injuring each other during their quarrels. On Thursday, April 9th, the husband left the house very early in the morning, and, when he returned, he found the door of the house locked, although he had left it open. One of the witnesses, who lived next door, deposed, that about half-past two on that day she heard the door of the deceased's room open, and the deceased called to her to

come up stairs. When she went into the room, she found the deceased in her night-dress, *standing in the room*, and covered with blood. The bed-clothes were also very bloody. Witness placed the deceased on the bed, and then perceived a wound in her throat. She asked her who had done it, but the deceased made no reply. The blood was dried about the wound, and was not flowing when witness first saw her. The deceased died in about an hour. When witness told the accused that his wife was dead from the wound, he said she must have done it herself, and that he was quite innocent of it. The husband appeared as if he had been drinking that morning. On looking about the room for a handkerchief, she saw a chamber-vessel, the sides and rim of which were marked with blood, but there was no blood in it: she also picked up a cap, saturated with blood, and in this cap was a pair of scissors. The deceased had a clean cap on, and it appeared to witness as if she had wiped her throat with the bloody cap, and then thrown it aside. The deceased had been for some time ill, and talked and acted so wildly on the Sunday previous to the event, that witness thought she could not be in her right senses. The husband admitted to the constable, who took him into custody, that he and his wife had quarrelled that morning, and he left home early. He said he did not know how the affair had occurred. The constable stated that there were no marks of blood on the dress of the accused, nor were there any on the floor, or on any other place, except the bed. This witness also deposed, that a person could get into the parlour, from the shop, without unlocking the parlour door.

The medical evidence was of the following nature. The witness said that he was called to the deceased on the Thursday afternoon. She had a wound in the throat, which had ceased bleeding, but she was then sinking fast. Witness asked her twice how it happened, and when asked the second time, she said "*her husband did it.*" He asked her how it was done, and she said with a knife, which was on the hob of the stove. Witness said to the deceased, he hoped that what she was then stating was correct, as the conversation would become of importance by and by. The deceased

replied, "I know that." He then asked where her husband was standing when he stabbed her; she made no reply to this question; but he was of opinion that when he had this conversation with her, she did not think that she should live. The wound in the throat was about an inch in length, about an inch and a half in depth, and had evidently been inflicted some time. It had, in his opinion, been produced by the small table-knife, which was found on the stove. The witness was then asked, whether the deceased could have stabbed herself; and then gone and placed the knife on the stove. He said he thought it *unlikely*; but there were instances of such rare self-possession. The wound was undoubtedly the cause of death; several of the larger vessels of the neck having been divided. The hands of the deceased were bloody, but there were no marks of violence on her person, with the exception of a few slight bruises. He was unable to say, whether the wound had been inflicted in the standing or lying position.

Several witnesses were called to show that the deceased had, for a long time, been very uneasy in her mind, that she had frequently threatened to destroy herself, and had once, indeed, made the attempt. On one occasion, she climbed up a chimney, and, on another, she ran into a neighbour's house, almost in a state of nudity. On the day previous to the event, the deceased was low-spirited and delirious. A few days before her death, she called at the house of one of the witnesses, and told him and his mother that she meant to destroy herself; and that she would hang her husband, for he should never live to enjoy her property.

One of the jurors remarked, that the finding of the scissors, in the bloody cap, was a singular circumstance; as also that a clean cap had been put on, which it was very unlikely for the husband to have done, had he committed the offence. A verdict was returned to the effect: "That the deceased was of unsound mind, and died of a wound on her throat; but how it was inflicted, no satisfactory evidence was before the jury."

There are several points in this case, which are worthy of the attention of the medical jurist. The wound itself

afforded no evidence by which it could be determined, whether it was self-inflicted or not: but the concomitant circumstances, together with the state of mind of the deceased, and her declared diabolical intention, a short time previously, of destroying herself and hanging her husband, can hardly leave a doubt that it was self-inflicted. The strongest points against the accused, were, I. The declaration of the deceased, that "*her husband did it;*" and which declaration, according to the medical witness, was made under circumstances that would, most probably, have rendered it admissible as evidence against him in a Court of Law. II. The admission of the medical witness, that he thought it *unlikely* that she could have stabbed herself, and then gone and placed the knife on the stove. With regard to these two points, it may be observed, that the declaration of the deceased could scarcely be considered worthy of belief, after her expressed intention to destroy herself, and to "*hang her husband,*" setting aside the fact that she had been suffering under delirium for some weeks previously to her death: and therefore was not unlikely to give random answers to the questions put to her. Indeed, one person deposed, that the deceased did not appear quite in her senses at this time. The admission, on the part of the medical witness, was such as might have thrown the balance of opinion very strongly in favour of homicide; but the circumstance of the deceased pointing out the place where the knife was found, with such exact precision, renders it probable that she must have put it there herself; and this probability is almost converted into a certainty, when we consider that the woman was actually *standing in the room*, at the time the first witness entered and discovered her wounded, and therefore must have been capable of moving from the bed to the stove. Hence it is by no means unlikely that she should have stabbed herself, and then placed the knife on the stove; nor would it require that she should have had any extraordinary degree of self-possession in order to do this. Instances have frequently occurred in which persons, on whom wounds of the throat of a more dangerous nature have existed, and in whom life could have remained

but for a very few minutes after the infliction of the wound, have been able to move from the spot. If the woman had been found dead on her bed, with the carotid arteries and jugular veins on both sides divided, then the discovery of the weapon, placed on one side at a distance from the body, would indeed have rendered it unlikely that it should have been placed there by her. But the deceased lived for more than an hour after the wound, and was standing in the room when first seen, with a clean cap on, which she must have had time to adjust before she unlocked the door of her room, and called for assistance. There is, therefore, every reason to think, from the evidence adduced, that the wound was inflicted by herself; and that her husband, notwithstanding the doubt left by the verdict of the jury, was really innocent of the imputed crime.

The direction of a wound, sometimes enables a surgeon to give an opinion as to whether it was accidental or not. The following case is related by Mr. Dunlop.¹ A friend of his, while stationed with the army at Ceylon, was called to see the wife of a sergeant, who had received a wound in the side, with a knife, which involved the uterus; the woman was then in the eighth month of her pregnancy. When asked, how it had happened, she stated, that while carrying out some knives which she had been cleaning, her foot slipped,—she let them fall, and fell on them, and the point of one entered her side. This female died in consequence of the wound, but before her death, she told some of her companions, women of the regiment, that her husband had stabbed her; and, as it was known that the parties had not lived on the happiest terms, suspicion was excited, and the husband was tried for the murder of his wife. On dissection, it was found that the *wound had entered from above, and had penetrated the abdomen downwards*, which led the examiner to think, that it could not well have happened in the manner first described by the deceased, namely by her having accidentally fallen on a knife. The verdict of the jury showed, that they put no credit in this first statement of the

¹ BECK'S Med. Jur. p. 338.

deceased; and as there were other circumstances, which tended to criminate the husband, he was pronounced guilty of manslaughter.

In sword or gun-shot wounds which traverse the body, and produce two orifices, it is often material to determine by which the sword or the ball entered the body. In regard to a sword wound, as most swords increase in size from the point to the hilt, so it happens that the orifice by which the weapon has entered, is of larger size than that by which it has passed out; and if the wound has proved instantly mortal, it is possible that we may find the soft parts depressed and the skin inverted, provided the thrust has been made with considerable force. The orifice by which the point of the sword has passed out, will present the reverse characters; it will be smaller, and the skin may be raised and everted under the same circumstances. Close and accurate observation, as well as some experience in regard to gun-shot wounds, is required to determine, where a dead body is found perforated by a ball, by which orifice it entered. The settlement of such a question is highly important as a medico-legal fact, for this may often be the only circumstance required to exculpate, or to complete the proof of the guilt of a party, accused of homicide. In order to shew that this is not a hypothetical view of the importance to be attached by the surgeon to the direction of gun-shot wounds, when mortal, I shall presently relate a case which has been published by Dr. Smith. The orifice by which a bullet has entered is small, usually much depressed at the margin, and there is said to be more contusion of parts than at the orifice of exit. The orifice of exit is large, more lacerated, and the integuments of the margin are commonly everted. In these cases, however, much would depend upon the distance at which the party received the shot, as well as the time which had elapsed before the wound proved mortal, supposing that he had been left alone and unassisted, and was unable, from his wound, to leave the place. In several instances, which came under my own observation, in Paris, during the revolution of 1830, I remarked that where the dress was perforated as well as the body, and where, as was

then generally the case, the shot was fired at a short distance, it was not difficult to point out the orifices of entrance and exit, from an examination of the dress alone. A friend, who was residing with me, received a musket-bullet in the left arm, while standing in a crowded street. He had turned round, and was in the act of pushing his way through the crowd, when a ball struck him, about three inches above the elbow-joint, posteriorly; it passed downwards, through the groove of the ulnar nerve, and escaped at the back of the fore-arm, about four inches below the elbow. With the exception of a feeling of numbness in the fourth and fifth fingers of the left hand, and the sight of the blood, he was not conscious of having been wounded. On taking off his dress, it was very easy to perceive, by the appearance of the orifices of the wound, that the ball had really penetrated above the elbow, and taken the direction described. On examining his coat, shirt, and flannel shirt, the orifices by which the ball had entered and passed out, were instantly recognised. The upper orifices were round, and as cleanly cut, as if a circular piece of the cloth had been removed by a pair of scissors,—the lower orifices were torn, extremely rough, and presented no regularity of form.

The case to which I just now alluded, wherein the direction of a gun-shot wound was an immediate object of legal inquiry, was tried at the Kent Assizes a few years since.¹ An officer in the Preventive service, was charged with having caused the death of a man, by shooting him. The deceased was in company with a strong party of smugglers, whom the prisoner and his men were pursuing. During their retreat, the companions of the deceased fired on the Preventive-service men, and there seemed great reason to believe that he was accidentally killed by one of the shots so fired, he being at the time between them and the pursuers. If, however, this had been the case, it was clear that he must have received the gun-shot wound in front, as he himself was in the act of retreating. On the other hand it was uncertain, from the general evidence, whether

¹ SMITH. For. Med. p. 290.

he had not been shot by the prisoner ; because, although it did not appear that shots had been fired by him or any of his party, yet it was proved that in running he tripped and fell, and his gun went off at the same instant, so that it was not impossible that the deceased might have received the mortal wound in this manner. The whole case, therefore, rested on the evidence of the medical witnesses. There were two surgeons, who were examined,—one for the prosecution, and the other for the defence.

The witness who appeared for the prosecution, deposed, that he found the body of the deceased traversed by a gunshot wound, which had caused death from the laceration of an artery, and the consequent hæmorrhage. One of the orifices of the wound was situated in the *lower* part of the buttock, and the other in the *upper* part of the groin, so that the latter was higher up than the former. He made an inspection of the body, and, in his judgment, the ball had passed through the bones of the pelvis, *from behind*. According to the opinion of this witness, therefore, the prisoner must have caused the death of the deceased.

For the defence, a surgeon in the navy, who, it appeared, had had considerable experience relative to gun-shot wounds, was called. He stated that he examined the body of the deceased, in the presence of the first witness, but he was of opinion that the ball had entered *in front*, and passed out behind the body. The reasons which he assigned for this opinion were, that the wound in front was much smaller than that situated behind, and its edges were smooth and depressed, or turned inwards ; while the opening behind was twice or three times the size of that before, and was ragged and uneven, the fragments of bone lying about the opening, and being partly lodged in the muscles of the buttock. These facts proved to him, most unequivocally, that the ball had entered in front, having, with diminished impetus, torn itself out posteriorly. If the ball had entered from behind, he should have expected that the fragments of bone would have been carried upwards and inwards into the pelvis, and would not have been lodged about the buttock. The value of this witness's evidence was most materially affected by

the cross-examination which he underwent. He then stated, that he did not make an inspection of the body until after it had been already inspected, and sewn up. He did not see the state of the bone itself, and his examination of it was but slight. He admitted that the openings of the wound would afford better evidence than the state of the bone; as also that the bone would certainly be shattered, where the ball had entered. They both agreed, in the first instance, that the ball had entered in front. No reason was assigned why his evidence afterwards differed so materially from that of his colleague.

Dr. Smith does not tell us what was the result of this case, and we are, therefore, left in doubt upon which of the two witnesses' opinions the verdict of the jury was based; but if the prisoner was found to have caused the death of the man, it would have been, upon the evidence, no more than misadventure. The view of the latter witness was, most probably correct, namely, that the ball had entered in front, and that he was shot by his own party;—because the reasons assigned by him, were satisfactory and consistent with all experience on the subject: but his opinion was invalidated by the admission that he had made but a superficial and imperfect examination of the body; as also that he did not see it until it had been inspected, and, therefore, not until the parts had been interfered with by others. The direction of the wound,—its passing from above downwards and from before backwards, also throws a shade of doubt upon its correctness: since, for the shot to have been fired in front, the individual who fired it, must have been much elevated above the deceased, a circumstance which did not appear from the evidence, or a ball could not have taken such a course: while, on the other hand, its direction was precisely such as it would have taken, if it had been discharged from the prisoner's gun, since it was established by the evidence, that he, the prisoner, had fallen while pursuing, and his gun had become then accidentally discharged.

CHAPTER VIII.

WOUNDS.

Circumstantial evidence in wounds,—detection of criminals by unexpected circumstantial proofs,—caution in drawing inferences. The number of wounds on a body,—the existence of two mortal wounds, no proof of homicide,—Of several wounds, which was first received? Identification of spots of blood on weapons,—tests proposed,—spots of lemon-juice mistaken for those of blood,—spots of rust,—blood on linen and other stuffs,—resemblance to madder-stains and iron-moulds. Barruel's process for distinguishing between human blood and that of animals,—objections,—medico-legal cases. Accidental origin of wounds, determined by circumstantial evidence. Wounds as they affect different parts of the body,—wounds of the head,—of the scalp. Extravasation of blood from blows,—case of Ready and Mullaney,—death ascribed to apoplexy,—Fagent's case,—England's case,—extravasation ascribed to excitement and intoxication,—Swift's case,—ingenious attempts of counsel to defeat medical evidence,—case by Sir C. Bell,—M'Cormick's case,—evidence on a recent trial,—concussion distinguished from intoxication,—inflammation of the brain produced by concussion,—suppuration in the brain,—its connection with the blow,—death from concussion after two years,—recovery from severe wounds of the brain. Acts of volition after severe injuries,—Can an injury to the head cause death without leaving any morbid changes?—case of the sieur Charles Crès,—general remarks.

Circumstantial evidence. In pursuing the examination of the question respecting the homicidal or suicidal origin of wounds, I shall call the attention of the reader to the force of evidence which is sometimes derived from the circumstances under which the body of a person, dead from wounds, is discovered. It may be said that this is a subject wholly foreign to the duties of a medical jurist, but I cannot agree in this sentiment: there are very few in the profession who, when called to aid justice, by their science, in the detection of crime, do not seek for circumstances by which to support the medical evidence, required of them. A practitioner would certainly be wrong to base his professional

opinion exclusively on circumstantial proofs ; but it is scarcely possible for him to avoid drawing an inference from these, as they fall under his observation, for or against the prisoner. His evidence may be of itself weak, and insufficient to support the charge against an accused party : in such a case, if any suspicious circumstances have come to his knowledge, he may be often unconsciously induced to attach greater importance to the medical facts than he is justified in doing ; in short he may, through a feeling of prejudice, which it is not always easy to avoid, give an undue force and value to the medical evidence. But if a proper degree of caution be used in drawing inferences from the circumstantial proofs, and they are not allowed to create a prejudice in his mind against a prisoner, a practitioner is, I think, bound to observe and record them ; for being commonly the first person called to the deceased, many facts, capable of throwing an important light on the case, would remain unnoticed or unknown, but for his attention to them. The position of a dead body,—the distance at which a knife or pistol is found,—the direction of the instrument,—whether situated to the right or left of the deceased,—the marks of blood about the person, clothes, or furniture of the apartment, are all circumstances which must assist materially in developing the real nature of the case. Many of these circumstances can fall under the notice of him only who is first called to the deceased, and, indeed, if observed by another, no advantage could be taken of them without the assistance of a medical man. Thus he may be asked :—Is the position of the wounded body that which a suicide could have assumed ?—Is the distance of the fatal weapon from the body, such as to render it improbable that it could have been placed there by the deceased ?—in answering either of which questions, he must take into consideration the extent of the wound, and the period at which it probably proved fatal. Again, he may be asked :—Has the deceased bled in more places than one ?—Are the streams of blood all connected ?—Are there any marks of blood on his person or clothes, which he could not well have produced himself ? These are questions, the answers to

which may materially affect the case of an accused party ; and the practitioner, in noticing and recording the circumstances involved in them, ought therefore to exercise great caution and deliberation. " The consideration of the nature of circumstantial evidence," observes Starkie, " and of the principles on which it is founded, merits the most profound attention. It is essential to the well-being at least, if not to the very existence of civil society, that it should be understood, that the secrecy with which crimes are committed, will not insure impunity to the offender. At the same time, it is to be emphatically remarked that, in no case, and upon no principle, can the policy of preventing crime, and protecting society, warrant any inference which is not founded on the most full and certain conviction of the truth of the fact, independently of the nature of the offence and of all extrinsic considerations whatever. Circumstantial evidence is allowed to prevail to the conviction of an offender, not because it is necessary and politic that it should be resorted to, but because it is in its own nature capable of producing the highest degree of moral certainty in its application. Fortunately for the interests of society, crimes, especially those of great enormity and violence, can rarely be committed without affording vestiges by which the offender may be traced and ascertained. The very measures which he adopts for his security, not unfrequently turn out to be the most cogent arguments of guilt. On the other hand, it is to be recollected, that this is a species of evidence, which requires the utmost degree of caution and vigilance in its application ; and, in acting upon it, the just and humane rule, impressed by Lord Hale, cannot be too often repeated :—*tutius semper est errare in acquietando quam in puniendo, ex parte misericordiæ quam ex parte justitiæ.*"¹

Many remarkable cases are on record, in which slight and unexpected circumstances have led to the detection of offenders. One instance has been already mentioned (p. 278), but there are others which are of a not less extraordinary

¹ Vol. I. p. 480.

character. A murder was committed, by shooting the deceased with a pistol, and the prisoner was connected with the transaction, by proof that the wadding of the pistol was part of a letter belonging to the prisoner, the remainder of which was found upon his person.¹ In another case of murder, one of the circumstances, which proved the prisoner to have been the criminal agent, was the correspondence of a patch on one knee of his trousers, with impressions made upon the soil, close to the place where the murdered body lay.²

In the celebrated case of Patch, who was tried for the murder of his friend, Mr. Blight, many years since, it was clearly proved, by the relative position of the deceased, and of the door from which he was shot, that the murderer must have fully exposed his person to view, and therefore have been identified by the deceased, unless he had fired the pistol with his *left* hand. Patch, who was strongly suspected to be left handed, was most closely pressed by his counsel previous to the trial, to confess whether he was or not : but he positively denied it. On arraignment he was called upon, as usual, to raise his hand and plead. In doing this, he unconsciously raised his *left hand*, and pleaded not guilty. This circumstance afforded a very strong presumption against him.³

In the year 1764, a citizen of Liege was found dead in his chamber, shot in the head ; and close to his body lay a discharged pistol, with which it was presumed he had committed suicide. The ball was discovered to have lodged in the head of the deceased, but, on comparing it with the bore of the pistol, it was found, owing to its size, that it never

¹ In a singular case, which was tried on the Oxford Aut. Circ. 1835, a man was charged with having sent to the prosecutor a parcel, containing a tin box, loaded with gunpowder, with intent to commit murder by the explosion. Here a piece of an old newspaper served clearly to connect the prisoner with the act. A fragment of the paper had been pasted in the box, and the piece of newspaper from which it had been torn, was found in the prisoner's possession.

² STARKIE. Vol. I. p. 486.

³ Prof. AMOS's Lectures. London Med. Gaz. Vol. VII. p. 543.

could have entered the barrel ; and, from this circumstance, it was inferred that the wound on the head of the deceased had not been self-inflicted. His niece, a girl of about sixteen, was charged with having been accessory to his death, and she narrowly escaped conviction ; but the real assassins were discovered after some years, and they then confessed, that having discharged several pistols at the deceased, and intending that it should appear as an act of suicide, they had laid one near his body, without observing that it was not the same by which he had fallen.¹

A case occurred in September, 1835, in the neighbourhood of this metropolis, in which a circumstance, observed by a medical practitioner, led to the detection of an offender. A desperate attempt at burglary was made on the house of a lady residing at Chipstead, and a relative of her's, in defending the house, fired at one of the burglars, through a broken pannel of a door, pointing his gun in such a direction, that the charge, which consisted of very large shot, rarely used in fowling pieces, should enter in front of the chest. The burglars escaped with their wounded companion. A surgeon, residing at a considerable distance from the spot, was soon after this called upon to attend a man, who stated that he had been accidentally wounded in the chest by the discharge of a gun. During his attendance, he extracted several of the shot and kept them. In the mean time the circumstances had become generally known, and a comparison was then instituted between the shot extracted from the man's chest, and some which the prosecutor still had by him. The size and shape were identical, and the man was committed for trial.

A more remarkable case than any which I have yet mentioned, is reported in the "State Trials." A woman, of the name of Norkott, was found one morning dead in her bed, with her throat cut, and a knife sticking in the floor of the room, near the bed. An inquest was held on the body, and a verdict of *felo de se* was returned. It appeared that three persons, relatives of the husband, who was at the time

¹ Theory of Presumptive Proof.

absent from home, slept in a room adjoining that in which the deceased lay ; some suspicion having been raised against these persons, the body was exhumed, and more closely examined, thirty days after interment ; and, from what was then discovered, these individuals were charged with the murder. On the trial, it was proved that the deceased was found lying in a composed manner in her bed, and the bed clothes were not at all disturbed. Her throat was cut from ear to ear, and her neck was *broken*. There was but a very small quantity of blood on the bolster, where the head of the deceased lay ; but, on turning up the bed, clots of congealed blood were found in the straw beneath. There was a quantity of blood on the floor, near the head of the bed, which had collected in the bendings of the planks, and there was another large collection at the foot of the bed ; but there was no communication between these effusions, or between either of them and that seen on the bed, so that it was evident the deceased had bled in several places. The bloody knife was found at some distance, and its handle was directed from the bed, the point sticking in the floor. All these circumstances were sufficient to shew that the death of the woman could not be ascribed to an act of suicide ; and it was admitted by all the prisoners, that no one had had access to the room in which she slept. One of the witnesses for the prosecution further stated, that on the *left hand of the deceased there was a bloody mark of a left hand*. This mark could not, of course, have been produced by the deceased on herself. It was a circumstance altogether irreconcilable with the supposition of suicide. The prisoners made no defence, and they were condemned and executed.

I have mentioned these cases, in order that the attention of the medical jurist may be excited to the importance of a close investigation of all the minutiae of a supposed case of suicide or murder, however trivial or remote from his strict professional duty, they may appear. Evidence of this nature, from a shrewd, attentive, and clear-sighted practitioner, will have considerable value ; and it is, indeed, to such a man that our legal authorities would chiefly look for the

development of many of the most important collateral circumstances. While, however, an attention to these facts is recommended, too much circumspection cannot be used in drawing inferences from them. The following case, which will shew the necessity of extreme caution, recently occurred in France. A young man was found dead in his bed-chamber, with three wounds on the front of his neck. The physician who was first called to see the deceased, had, unknowingly, stamped in the blood with which the floor was deluged, and had then walked into an adjoining room, passing and re-passing several times; he had thus left a number of bloody foot-prints on the floor. No notice of this was taken at the time, but on the following day, when the examination was resumed, the circumstance of the foot-prints was particularly attended to, and excited a suspicion that the young man had been murdered. The suspected person was arrested, and would have undergone a trial on the charge of murder, had not M. Marc, one of the leading physicians of Paris, been called in, to examine all the particulars of the case. So determined appears to have been the suicidal deed, that, as mentioned above, the deceased had made three distinct and deep incisions across his throat. The lowest was about two inches above the sternum, and had divided the trachea, œsophagus, the carotid artery, and jugular veins completely across, and had even reached the anterior ligament of the cervical vertebræ: the other two incisions were higher up, but had not penetrated deep enough to wound these important organs.¹

It has been well remarked, that "the force of circumstantial evidence being exclusive in its nature, and the mere coincidence of an hypothesis with the circumstances being in the abstract insufficient unless they exclude every other supposition, it is essential to inquire with the most scrupulous attention, what other hypothesis there may be, which will agree wholly or partially with the facts in evidence."² A medical man, therefore, in noticing facts, which appear to indicate murder, connected with the body of a person found

¹ Med. Chirurg. Review, April, 1835, p. 520.

² STARRIE. Vol. I. p. 513.

dead, and concerning the manner of whose death nothing certain is known, should endeavour to determine whether there be no other possible assumption than that of murder, upon which these facts may become explicable. This is a rule which he should invariably follow, before he allows any medical circumstances, which may have fallen under his immediate observation, to bias his opinion against an accused party. Many unfortunate cases are on record, where persons have suffered capital punishment for crimes of which they were entirely innocent; but where circumstantial proofs, then apparently irreconcilable with each other upon any supposition than that of their guilt, prevailed against them.¹

It has been lately proposed, by M. Quetelet, to apply the principles of Statistics to the settlement of these doubtful questions. Thus it is said :—" if a man be found killed, and nothing decided offers itself to explain the manner of his death, the known average ratio of suicides to murders, in the general population, would indicate the degree of probability of his having destroyed himself; and the ratio of suicides in persons of the same age and sex as the victim, to the total number, would give an additional degree of precision to the conclusion." In France, the ratio of suicides to murders, M. Quetelet states, to be as 48 : 20, or nearly as 5 : 2. On the supposition, therefore, of the

¹ From among these cases, I shall select one which is related by Starkie. It shews that a person may be innocent of a crime, although every circumstance may appear to establish the contrary. A servant-girl was charged with having murdered her mistress. It was proved, in evidence, that no persons were in the house at the time, but the murdered mistress and the prisoner : the doors and windows being found closed and secured on the inside as usual. The death of the mistress could only be ascribed, from the circumstances, to an act of murder, and the prisoner was convicted, chiefly upon the presumption, from the state of the doors and windows, that none could have had access to the deceased but herself: she was accordingly executed. It afterwards came out, by the confession of one of the real murderers, that they had gained admission into the house, which was situated in a narrow street, by means of a board thrust across the street, from an upper window of the opposite house to an upper window of the house of the deceased; and, that after committing the murder, they retreated by the same way, leaving no trace behind them. STARKIE.

presence of fatal wounds on the body of a Frenchman, which might be ascribed with equal propriety either to homicide or suicide, it is five to two that no murder has been committed ; but if the victim is of an age at which suicides are rare, the probability of murder is increased : whereas in the contrary case, if the age of the deceased be that at which suicides are most frequent, the probability of murder would be much reduced. It is scarcely necessary to observe, that this method of settling difficult medico-legal questions, although highly ingenious, is of too remote and speculative a nature to render it serviceable for the purposes of justice. Many years must elapse before the premises on which the pretended solution of such questions is based, can be regarded as sufficiently free from objection, to render them safely admissible.

It is necessary for the medical jurist to notice the *number* of wounds on a dead body. In suicides, commonly, one wound only is seen, namely, that which has caused death. But there are exceptions to this remark : an instance was just now given, in which three wounds were met with on the throat of a man who committed self-destruction ; and it is not very uncommon for an individual to make several attempts on his life by different weapons. When there are more wounds than one on the body of a suicide, it is generally observed that one only is mortal ; but it is not therefore to be considered, that the existence of two or more mortal wounds on a body is a proof of homicide. If an individual perish *immediately* from a wound, it is certainly impossible that he should have the power of inflicting another upon himself ;—but it is placed beyond all doubt, that a person may survive a wound, which an examiner would pronounce, according to the rules of art, to be instantaneously mortal, a sufficient length of time to inflict one or more serious injuries upon himself. Examples of the power of surviving, and of performing acts of locomotion in fatal wounds, will be given hereafter, in speaking of injuries to the neck and heart ; and as more directly relating to the question of which we are now treating, I shall quote the following case, of recent occurrence, from Orfila. A

gentleman of Rouen, was found dead in his chamber. Two pistols were lying in the room,—one near the body, and the other on the bed, at some distance from it. An investigation was made on the spot, and it was then discovered that the deceased had shot himself in two places. One wound, which had apparently been inflicted while he was lying on the bed, had completely traversed the left side of the chest, breaking a rib before and behind, perforating the lung through its middle portion, and passing near to the roots of the pulmonary veins. A very large quantity of blood had become extravasated in the thorax. In spite of the existence of so serious an injury, it appeared that the deceased must have risen from his bed,—walked to a closet to procure another pistol, with which he produced a second wound, that must have proved instantly mortal. The ball had entered at the frontal bone, and, after traversing the left hemisphere of the brain, had become lodged against the *os occipitis*. There was not the least doubt of this having been an act of deliberate suicide.¹

This case should inspire caution in the expression of an opinion: but at the same time, it is to be remarked, that such occurrences are rare; the existence of several mortal wounds on a subject affords a presumption of homicide, which is open to be confirmed or rebutted by other circumstances.²

Where two or more wounds exist on a body, evidently inflicted during life, and one of them only is mortal, while the others are not, the latter may be regarded as having been first received. In charges of homicide, it may become of importance to establish a point of that nature, at least presumptively; but to shew that such a rule is not universally applicable, I will relate the following case:—A trial took place at the Norwich assizes, a few years ago, in which some poachers were charged with the murder of a gamekeeper, by shooting him. There were two gun-shot

¹ ORFILA. Vol. II. p. 548.

² By a *mortal* wound, the reader will understand that I am here speaking of a wound, which would commonly be considered sufficient to produce immediate death.

wounds in the body of the deceased, one of which had traversed the chest from before backwards, producing fatal hæmorrhage, so that it was probable he had died immediately: in the other wound, the ball had penetrated at the groin, and had passed obliquely upwards and backwards, traversing the abdomen, and passing out behind without producing any serious mischief. It was considered essential to the case to account for the direction of this wound, since the prisoners were standing, and, according to the evidence, had fired in a volley at the deceased with their guns directed horizontally at him. The medical witness considered that the wound which had passed through the chest and proved fatal, was first received; and he attributed the direction of the lower wound to the circumstance of the deceased having probably received the second shot, while in the act of falling.

It is scarcely necessary to notice the very singular proposition, made by M. Foderé, in order to distinguish, in certain cases, homicide from suicide, by the appearance of the features of the deceased. "Thus," says this enthusiastic writer, "a man who has killed himself in a fit of despair, preserves for some time after death, the convulsive attitude which his members assumed at the moment of committing the fatal deed. The eye of the suicide is wild,—the muscles of the face are tense, and the eye-brows contracted: this state of the countenance is preserved until the animal heat has left the body. On the other hand, he who has been the victim of a murderer, bears upon his countenance, unless he has endeavoured to defend himself, the impression of terror, the extreme paleness of death, and a perfect relaxation of the features."¹ However vague many of the rules of legal medicine may appear, the time has not yet arrived, in which we are compelled to make use of principles like these, for the settlement of such difficult questions.

Identification of Spots of Blood. In the performance of his duties, the medical jurist may be asked whether he can identify spots of blood found on linen, weapons, or other

¹ Vol. III. p. 187.

bodies : for the presence of these, if satisfactorily established, will often add considerable weight to the evidence against a prisoner. The French medical jurists have bestowed much attention on the means best adapted for the identification of these spots ; and some among them have asserted, that not only is it possible to identify stains of blood, on linen or on weapons, after a considerable period, but that the blood of the male may be distinguished from that of the female, and the blood of different animals from that of a human being. I shall, in the first place, detail the processes recommended by Orfila, for the detection of blood on articles of steel or linen.

I. *On articles of Steel.* If the quantity of blood be small, it generally forms a transparent red spot on the surface of the steel, but where the quantity is greater, the colour is of a deep reddish brown colour. On exposing the weapon to a moderate heat, those spots which have an appreciable thickness, become raised and gradually scale off, leaving the metallic surface beneath, tolerably clean. When these portions of dried blood are heated in a small tube, to a high temperature, ammonia is liberated, which is indicated by the alkaline reaction of the vapour on ordinary test paper. If the spot be treated with distilled water, this gradually acquires a reddish colour, leaving by slow maceration, should the blood be of any thickness, a white filamentous mass on the surface of the metal. This solution will be found to possess no alkaline reaction, even although it may remain exposed several hours. A solution of chlorine, in small quantity, renders it green, without precipitating it ; but if more chlorine be added, the solution becomes at first decolorized, then opaline, and finally a flocculent white precipitate falls down. Ammonia does not sensibly affect its colour, while this alkali is known to alter many red vegetable colours, as solutions of cochineal, Brazil-wood, &c. Nitric and sulphuric acids occasion a brownish white precipitate, and the solution is almost deprived of its colour. The ferrocyanate of potash does not affect it ; but the aqueous infusion of galls throws down the red colouring matter, giving its own hue to the residuary liquid. When the

solution of blood is exposed to heat, the liquid, if diluted, becomes opaline; but if at all concentrated, a coagulum separates on boiling. Should the spotted steel-instrument be left for a long time macerating in water, exposed to air, a small quantity of peroxide of iron may be formed, which from being partly suspended in the liquid, will give to it a yellowish colour : this extraneous matter is, however, easily separable by filtration. Orfila has found that the thinnest stains of blood have yielded, by slow maceration, sufficient serum and colouring matter to distilled water, to give rise to precipitates with nitric acid and the infusion of galls.

Spots may be met with on steel-instruments, closely resembling those produced by blood. According to the author, whose statements I am now quoting, this resemblance is chiefly witnessed in those stains which are produced by *lemon-juice*, or by the common oxidation of the metal from exposure to the air when wet. In the case of lemon-juice, *citrate of iron* is formed, which, at first view, might be mistaken for dried blood. In order to shew that a mistake of this kind may be made, Orfila mentions, that a man was not long since suspected of having murdered another; and a knife, apparently spotted with blood, was found in his possession, which was regarded as a strong circumstantial proof of his guilt. The weapon was sent to the laboratory of the Faculty for examination, where it was ascertained that the supposed spots of blood were nothing more than citrate of iron. The instrument, it appears, had been used some days previously, for the purpose of cutting a lemon, and not having been wiped before it was put aside, a simple chemical action had gone on between the acid and the metal, which had given rise to the appearance.

The characters of the spots formed of *citrate of iron* are thus described. Where the quantity of lemon-juice on the metal is small, the spot has commonly a reddish yellow colour; but where the juice has existed in larger quantity, it assumes a deep brown tint, something similar to dried blood. In the latter case, a moderate heat suffices to cause the spot to scale off, and leave a clean surface of metal beneath. On exposing the detached citrate to

heat in a tube, a volatile matter escapes which has an *acid* reaction on test paper. On plunging the instrument in distilled water, the citrate of iron is soon detached, and the water acquires a yellow tinge. The solution thus obtained, has an acid reaction, is precipitated by alkalies, the oxide of iron being thrown down: it yields a black precipitate with infusion of galls, and a blue precipitate with the ferrocyanate of potash, either immediately or after slight exposure to the air.

Spots of Rust. These spots are formed, in the first instance, of the protocarbonate, and afterwards of the peroxide of iron: they may be produced on any steel-instrument, which has become accidentally wetted, and subsequently exposed to the free contact of air. They vary from a yellow to a deep ochreous red colour. When the instrument is moderately heated, the spot of rust does not scale off, like that of blood or lemon juice. When heated in a glass tube, the spot of rust gives off ammonia, and produces an *alkaline* reaction on test paper,—in which respect, it resembles the spot of blood. The reason why rust, when heated, gives off ammonia, appears to be due to the fact, that the alkali is formed and absorbed by the rust in the decomposition of water during the chemical change to which it owes its formation. If the instrument be allowed to macerate in distilled water, the spot of rust is not dissolved; it is, however, in the course of time, detached from the metallic surface becoming in part precipitated and in part suspended, and giving a yellowish colour to the water. By filtration, the water is obtained perfectly clear and free from the least trace of colouring matter, which is not the case where the spot has resulted from blood or lemon-juice. This filtered liquor is also destitute of any portion of iron, as Orfila found that none of the tests for iron affected it.

It is by the action of muriatic acid that these three kinds of stains are most readily distinguished from each other. A drop of the pure, colourless acid, placed on the spot of dried blood, does not remove it, nor does it change its colour, and the resulting liquid is not affected by the tests for iron.

If the acid be placed on the spot produced by lemon-juice, it instantly acquires a yellow colour, the stain disappears, and the metallic surface becomes exposed:—the same changes are also produced in the spot of rust; in these two cases, by diluting the muriatic acid and employing the tests for iron, the presence of that metal is satisfactorily indicated by the characteristic precipitates.

II. *Spots of Blood on Linen and other Stuffs.* The mode of proceeding in this case is similar to that recommended in regard to spots existing on steel, namely, to separate the colouring matter and albumen by water, and to act on the solution by the reagents already pointed out. The piece of stuff on which the blood has dried, should be cut out, and placed to macerate in a small quantity of distilled water. The colouring matter and the albumen, if the spot be of any thickness, is rapidly separated in striæ, which sink to the bottom of the liquid, while the fibrin is left adhering as a white filamentary mass to the surface of the stuff: the fibrin is more readily seen on those stuffs which are unbleached, and it is sometimes in sufficient quantity to be scraped off the surface by the finger nail. The facility with which the fibrin is seen will, however, depend upon the length of time which the stuff has been in maceration, as well as upon the quantity of blood existing on the stuff. There are cases in which it may not be perceptible, such, for instance, as where the dried spot has been rubbed or washed in attempts to remove it, or where the stuff has imbibed the blood from another portion of stuff, directly impregnated with that fluid. In the first case, the fibrin may have been removed mechanically: in the second, it appears as if the stuff which was bloody retained the fibrin, and only allowed the colouring matter and a portion of serum to transude. According to Orfila, fibrin is never found in the spots of blood thus formed by imbibition. In a case, therefore, where the blood directly flowed on a shirt, and produced a stain on any stuff beyond, a portion of which latter only the medical jurist might receive for examination, the absence of fibrin from the spot after maceration, ought not to excite surprise.

The preceding experiments have all been repeated with the same results on the blood of the human subject, of the ox, sheep, dog, and pigeon.¹

The conclusion which Orfila has drawn from these experiments, namely, that a spot of blood may be identified in very small proportion, so as to render it safe for the medical jurist to speak positively on the subject, has been strongly objected to by a late writer.* Raspail prefaces his objections by remarking that an error in chemistry may be easily remedied; but an error in legal medicine may be productive of consequences which cannot be remedied. He states, that, by macerating a small quantity of madder in a weak solution of albumen, he produced a liquid which gave all the reactions described by Orfila, as characteristic of the presence of blood. Orfila showed, however, that the real spot of blood underwent a change, by exposing it to a boiling temperature, while the artificial spots remained unaltered. But Raspail affirms, that, if a small quantity of tannin and salt of iron be added to the madder-spot, so that no combination takes place until the stuff is exposed to a boiling temperature, the madder-spot will present the same character as that formed by blood. Without pretending to define how far Raspail's last objection is valid in the particular instance adduced, I cannot but agree with him in thinking that there are many mixtures of bodies in nature, the existence of which is yet unsuspected by chemists, that may present considerable analogy with the blood. In regard to alizarine, the colouring matter of madder, Berzelius, who admits that a stain produced by this body may very closely resemble the stain of blood, suggests that the difficulty is readily got rid of by the following means. The colour of madder is rendered yellow by acids, and violet by alkalies. If, therefore, on adding a drop of acetic acid to the spot, it changes from red to yellow, this is a proof that it has been produced by madder; for the spot formed of the colouring matter of blood is unaltered by acetic acid at a low temperature, and is rendered of a deep brownish hue by boiling. The infusion of galls

¹ Med. Leg. Vol. II. p. 564.

* RASPAIL. Nouveau Système de Chimie Organique, p. 381.

throws down the colouring matter of blood without altering it, but it precipitates an albuminous solution of alizarine, of a bright yellow.¹

Among the tests proposed for the detection of blood in solution, as obtained either from the allowing steel-instruments or stuffs spotted with blood to remain in water, there are only two which I consider to be of any value. The ready separation of the colouring matter by water with the tint which the liquid acquires when cold, and the coagulation of the solution with the entire destruction of colour on boiling. The colouring matter of blood in solution, is known from most other kinds of red colouring matter by its remaining unaltered on the addition of ammonia; and the presence of the albuminous part of the blood, is detected on boiling, or on the addition of a mineral acid. In order that coagulation should take place on boiling, however, it is necessary that the blood should not be too much diluted; for, in this case, although the solution may lose its colour, it will not even become opaline. With regard to the action of chlorine, it is true that a solution of this gas will turn the sanguineous solution green, and, if continued to be added, will decolorize it; but I have never observed any opalescence or precipitation in weak solutions of blood, such as those obtained on the maceration of articles of steel or linen in distilled water. The ferrocyanate of potash, by not affecting the solution of blood, serves to distinguish blood-stains from those produced by iron, under the two conditions mentioned. It is no test for the presence of blood.

With regard to the action of reagents on the red-coloured spots liable to be met with on stuffs, the non-alteration of colour, by the addition of acetic acid or ammonia, is no proof that the spots are derived from blood. There are some red dyes which remain unaffected on the application of these bodies, and so far such spots might be confounded with those of blood: but a very satisfactory means of distinguishing them, is, to suspend a portion of the coloured stuff for a short time in distilled water. If the colour be due to blood,

¹ BERZELIUS. *Traité de Chimie*. Vol. VII. p. 83.

it will be entirely washed out, and the bottom of the liquid will be coloured :—if the colour be owing to any fixed red dye, then water will have no action upon it, however long it may remain.

Iron-moulds on linen have sometimes been mistaken for spots of blood, but their real nature is easily determined by the means above stated. Let a portion of the discoloured stuff be cut out and suspended in water : if the discolouration be owing to blood, a coloured solution will be obtained ; but this is not the case when the discolouration is owing to an iron-stain. To detect the latter, we may treat the stuff with water, acidulated by muriatic acid ; the spot will speedily disappear, and, on applying the ferrocyanate of potash and tincture of galls, the presence of iron will be immediately rendered evident.

M. Devergie relates a case in which he, with others, was required to determine the nature of some red-coloured stains found on the shirt of a young man, whose body was taken out of the Seine, after having lain about three weeks in the river. There were many marks of violence about the person, and it was deemed important to ascertain whether the spots on his linen were owing to blood or not. The process above mentioned was adopted, and it was satisfactorily determined that the marks were owing to the rusting of a steel neck-chain and a bunch of keys, which the deceased had about him.¹

Under all the circumstances, we may look upon the experiments detailed for the identification of spots of blood, as leading only to a presumption, which may be more or less strengthened by other facts of a circumstantial nature. The evidence afforded by the results of these, is far from having that exclusive character which circumstantial evidence ought to have. One mixture of substances has been already pointed out, as liable to give rise to mistakes. A distinction, it is true, has been made, which cannot fail to be satisfactory to the minds of chemists ; but because there are no other sources of error immediately apparent to us, we must

¹ DEVERGIE. Médecine Légale. Vol. I. p. 237.

not hastily infer that such do not exist.¹ In a medico-legal investigation of this nature, therefore, I should advise the practitioner, on obtaining the results mentioned as characteristic of the presence of blood, to state merely that they afforded a probability, and not a positive certainty of the presence of this fluid. It is better to err on the side of caution, than of rashness ; and the witness who, in his evidence, placed unhesitating confidence on the results of such experiments, might prepare himself for a severe cross-examination, in which the weak grounds for his opinion, would be fully sifted and exposed.

Let us imagine then, that the spots discovered are satisfactorily proved to have been produced by blood, it may still be a question, whether the blood be that of a human being or of an animal. We will now proceed to the examination of the processes by which it has been attempted to answer this important question.

Orfila, and M. Lebaillif, at first thought that microscopical observations on the shape of the red particles, would suffice for establishing a distinction between the blood of mammalia and that of birds and fish. In the former, the particles, as is well known, are circular ; in the latter they are elliptical. But from numerous and careful experiments, it was found that microscopical observations were altogether insufficient for the purpose. Indeed, Orfila candidly confesses, that in regard to the colouring matter obtained from blood dried on stuffs, it was not only extremely difficult to distinguish that of the pigeon from that of a human being, but it was often impossible to determine whether the colour of the liquid was or was not owing to blood.

A process more remarkable for its singularity, than, as it appears to me, for its correctness, was afterwards suggested

¹ The reader will of course understand that I am here presuming the nature of the spots to be extremely doubtful, and absolutely requiring medical evidence for their identification. Such a case must exist where cloths or rags are discovered after the lapse of many years, and in which the recognition of any coloured spots is rendered difficult to the eye, either by their having become in part effaced or soiled by long exposure.

by M. Barruel. This chemist entertains the idea, that blood contains a volatile principle, peculiar to each species of animal, which is capable of being set free and of becoming recognized by the smell, on the addition of concentrated sulphuric acid to a portion of the liquid or of the serum only: and this effect, he states, will follow, whether the blood be fresh, or whether it has remained in a dry state for several years. The volatile principle, according to him, possesses an odour which resembles more or less that of the cutaneous exhalation of the animal. Thus, in man, it is said to resemble the human perspiration; in the ox, the odour of oxen; and in the horse, the odour of its perspiration. It is also pretended that the odour peculiar to each animal, is stronger in the blood of the male than in that of the female.¹

These opinions have been attacked by M. Raspail, who has shewn that the accidental admixture of various substances, even of animal excretions, will cause a material alteration in the odour developed by the addition of sulphuric acid to blood. Thus the blood of the ox, when mixed with saliva or mucus, gave out the odour of human blood; and the odour obtained from sheep's blood was found to vary much on its admixture with other bodies. As more important objections, it may be mentioned, that the odour will, according to this experimentalist, vary with the state of health of the subject from which it is taken; and it may be readily conceived that the acuteness of the sense of smell in the operator, which doubtless is not the same in any two individuals, will give rise to differences that can neither be estimated nor calculated. Sulphuric acid, in Raspail's view, produces the odour by the heat extricated on its admixture with the blood: this causes a more rapid escape of vapour, and at the same time, probably by the decomposition of some generated ammoniacal salt, produces the impression on the nose.² Whether this be a correct explanation or not, it is certain that sulphuric acid does disengage, from recent blood, a volatile product of a peculiar odour; but

¹ *Annales d'Hygiène*. Tome X. p. 166. TURNER'S Chemistry, p. 891.

² *Op. Cit.* p. 383.

I have found that it varied according to the proportions in which the blood and acid were mixed : also that the odour varied considerably by allowing the blood to stand for a short time. I have sometimes been able to discover a difference in the odour extracted from bullock's blood, but it has always appeared to me impossible to define in what the difference consisted. To attempt to classify these odours, or to pretend that they can be made applicable to the identification of the blood of different animals, for the purposes of legal medicine, is, therefore, in my opinion, very dangerous trifling with a very serious subject.

Having then fully stated the means by which medical jurists have endeavoured to identify spots of blood, I shall relate a few cases, in order to shew how these means have been practically applied to forensic purposes.

In a case of rape, M. Chevallier was requested to ascertain whether stains found upon the linen of a female, were spots of blood or not. Having cut out a portion, which was discoloured, it was suspended in the upper part of a tube of distilled water. A soluble matter became, in the course of an hour, detached from the linen, and subsided to the bottom of the vessel, giving a reddish brown colour to the liquid, precisely similar to that produced on the admixture of blood with water. The coloured solution was found to possess an alkaline reaction, but, on farther examination, this was ascertained to be due to some alkaline substance contained in the linen itself. When heated to the temperature of ebullition, the liquid became turbid, and a reddish grey coagulum separated, which, when treated with pure potash, was taken up, and formed a solution that was green by reflected, and red by refracted light. The infusion of galls threw down a reddish grey precipitate. These characters, besides the colour of the stains, led M. Chevallier to pronounce that they had been produced by effused blood.¹

On another occasion, M. Chevallier was required, in conjunction with M. Barruel, to undertake the investigation of the nature of some stains found on a cloth, in the house

¹ Annales d'Hygiène et de Méd. Lég. Janvier, 1832.

of a man who was suspected of murder. The prisoner declared that the stains had been produced by the wrapping of some fresh meat in the cloth, a year before. The largest stain had a yellowish brown colour, and the cloth was somewhat stiffened around it, as if by the desiccation of the effused liquid. From these characters, they did not consider that blood had been effused on the stuff, but that it had been imbibed from some substance already impregnated with that liquid. A piece of the stained cloth, having been cut out, was allowed to macerate for a period of eighteen hours in four ounces of distilled water. The solution obtained was turbid, and had a reddish tinge, but it was rendered perfectly clear by filtration. A portion of it was then heated in a tube, to about 150° : it lost its transparency, became opaline, and, on boiling, a greyish brown coagulum separated, the solution becoming at the same time perfectly decolorized. This coagulum was dried and divided into two parts,—one of these was heated to a high temperature, and it gave out an ammoniacal odour, like all animal matter. The remainder of the coagulum was digested at a moderate heat, in a few drops of pure potash: it was rapidly dissolved, and the solution was of a brownish green, by reflected, and of a brownish red by refracted light.¹ The results of these experiments, in the opinion of the examiners, most unequivocally proved that the stains on the cloth were produced, if not by pure blood, at least by two of its component parts, namely: by the serum and colouring matter, the latter being in very small proportion.

Another question which they had to determine, was, whether the blood were that of a human being, or whether the stain were owing, as the prisoner alleged, to the draining

¹ This is an additional test of the presence of blood, to which, importance seems to be attached by some of the French medical jurists. The difference of colour in the alkaline solution of the red coagulum is scarcely perceptible. The redness of tint, when viewed by refracted light, is so extremely slight, that it requires some exertion of the imagination to perceive it. It cannot be at all perceived, except in narrow tubes, and would certainly escape the observation of those examiners whose eyes were not prepared for it. It is one of the most weak and unsatisfactory of all the pretended tests for the detection of blood.

of butcher's meat. To determine this, it was necessary to concentrate the liquid, by exposure, for some time, *in vacuo*, above a vessel containing sulphuric acid. In the course of two days, a large portion of the aqueous part of the liquid had evaporated: it had become viscid, and its red colour more intense. A few drops of strong sulphuric acid were then poured on it, in a glass: a thick, dark coloured coagulum fell down, which, however, was dissolved, by adding a large excess of acid; and the solution, now of a reddish brown colour, gave out a peculiar odour, which, according to the examiners, was similar to that produced by the blood of the sheep,—an odour analogous to that of the grease on sheep's wool. So far as this experiment went, it supported the allegation of the accused.¹

In a still more recent case, M.M. Orfila, Barruel, and Chevallier state, that they were enabled to determine whether it was the same blood which had been shed on two different kinds of stuff. Three men were charged with murder, and, among numerous articles stained or saturated with blood, which were sent for examination, were the clothes of the deceased and a piece of blue stuff, that had formed part of a female's dress. It was considered important, as a point of circumstantial evidence, to determine whether the apparently bloody stains, which were visible on this latter article, had been produced by the same blood as that which was on the clothes of the deceased and on the clothes of the prisoners.

A small portion of the deceased's clothes was macerated in water, until a coloured solution was procured. This liquid presented all the characters of a solution of blood,—it coagulated, and was rendered colourless by heat,—the coagulum, when treated with pure potash, produced a liquid, having the physical properties described in the two preceding cases. The infusion of galls gave a reddish grey precipitate. Chlorine, at first, rendered it of a green colour, and afterwards decolorized it. A large excess of alcohol threw down a fine rose-red precipitate. To a considerable quantity of the

¹ Annales d'Hygiène. Vol. X. p. 160.

solution, sulphuric acid was added, and the mixture well stirred. An odour, analogous to that of the human perspiration, was immediately perceptible. This proved that it was human blood.

The blue stuff was now macerated in water, and one-half of the solution thus obtained, was submitted to the action of the above reagents, with similar results, rendering it probable that the stains on this article were also due to blood. The other half of the solution was treated with strong sulphuric acid, when the odour which escaped, was recognized by one of the examiners to be that of the catamenia, while by another, it was pronounced to be excrementitious. This difference was considered unimportant; as whichever opinion was correct, they felt themselves justified in considering that the stains on the female dress, were not produced by the same liquid as that which existed on the dress of the deceased.¹

Accidental origin of Wounds. I have hitherto treated of wounds as resulting from homicide or suicide: but the medical jurist must remember, that a mortal wound may be *accidentally* received; and suddenly destroy life. Such a case is generally determined by circumstantial evidence, combined with moral presumptions, concerning the previous state of mind of the deceased. It is of high importance, on these occasions, that the body should not be moved from the spot; and that the weapon with which the wound was inflicted, should be seen in the position which it assumed at the moment of death. If any of the relations of the deceased with surrounding objects, have been disturbed, —if the weapon has been removed, and the body transported to a distance, then it will not always be easy to distinguish a wound accidentally received, from one inflicted by a suicide or a murderer. The evidence of those who find the body can alone clear up the case; and the medical witness may be required to state how far this evidence is consistent with the situation, extent, and direction of the wound by which the deceased has fallen.

¹ Annales d'Hygiène. Oct. 1835.

It is unnecessary to dwell further on this subject, since the observations made in the preceding pages, will suggest to the practitioner the course which he has to pursue. Circumstantial evidence is commonly sufficient to shew whether a wound has been accidentally received or not; but as an accidental wound may sometimes resemble one of homicidal or suicidal origin, so it follows that it is not always possible for the medical jurist to decide the question peremptorily from a mere inspection of the wound.

One instance has been already given, in which a homicidal was distinguished from an accidental wound, by the direction which it took (p. 361); and it would not be difficult to produce other instances where murderers, in their defence, have alleged that the wounds observed in the bodies of their victims were of accidental origin, but which allegations have been clearly refuted by the medical evidence. The witness must be prepared, therefore, in all cases where death has taken place *in secrecy*, and the nature of the wound is such as to render its origin doubtful, to be closely examined by the counsel of a prisoner charged with felonious homicide, as to whether the wound might not have been accidental. Our law requires that it should be rendered evident to a jury, before such a charge can be sustained, that the fatal wound could not have been accidental or suicidal. Hence this preliminary question is deserving of serious attention from the medical jurist.

I have hitherto considered the death of a party, from wounds, as a subject connected with a criminal charge; but an investigation of the circumstances under which death ensues, is occasionally rendered necessary where the deceased has effected an insurance on his life. A policy of life-insurance is rendered void by the act of self-destruction; and therefore an individual, bent on suicide, might, for the sake of his family, take precautions to conceal the manner in which he intended to destroy himself. His body might be found wounded in a way which would render it uncertain whether he had been wounded accidentally, whether he had been murdered, or whether he had fallen by his own hand. In a disputed case, it is incumbent on the Office to

prove the act of suicide, while the relatives of the deceased would attempt to shew the contrary. Such litigation will, of course, call forth a most deep and searching investigation into all the circumstances connected with the death of the insured party; and the whole case would, in some instances at least, rest almost exclusively on the medical evidence.

So again, a forfeiture of property being consequent on a verdict of *felo de se*, a suicide might resort to expedients in destroying himself, to prevent such a verdict from being returned. An individual may also, in order to save his memory from dishonour, endeavour to make his death appear a result of accident, or of homicide; but, as it has been well observed by a great legal authority, such attempts, like those of murderers to simulate suicide in the murdered corpse, seldom succeed; so difficult is it, to substitute artifice and fiction for nature and truth.

WOUNDS AS THEY AFFECT DIFFERENT PARTS OF THE BODY.

There are numerous medico-legal questions connected with wounds, as they affect different parts of the body, which now call for examination. It will not be necessary to enter into any lengthened surgical details respecting them; but a full investigation of the symptoms caused by wounds of different structures, is of importance in legal medicine. It is by attention to these only that a correct prognosis can be given; and, where death is not a speedy result, the treatment of a prisoner by a magistrate, will materially depend upon the prognosis of the medical practitioner. By far the most important questions arise where death has taken place after a severe injury, but under circumstances which render it doubtful whether the fatal event can be fairly ascribed to the injury or not. This subject has been already treated of in relation to wounds in general; but it was then impossible to specify all the modifications that are liable to present themselves according to the particular part of the body affected. The danger of wounds,

and their influence in causing death, are then the points to which I wish to call the attention of the reader, in the observations about to be made.

Wounds of the Head. These have been divided into external and internal; but they may be better arranged into those which affect the parietes, and into those which affect the brain.

Incised wounds, affecting the *scalp*, rarely produce any serious effects, but this will, of course, depend on their extent. When the wound is contused, and accompanied by much laceration of the integuments, it is highly dangerous, in consequence of the tendency which the inflammatory process has, to assume the erysipelalous character. The results of such wounds are, however, often such as to set all general rules of prognosis at defiance. Slight punctured wounds will sometimes terminate fatally in consequence of inflammation being set up in the tendon of the occipito-frontalis, followed by extensive suppuration beneath; while, on the other hand, a man will recover from a lacerated wound by which the greater part of the integuments may have been stripped from the bone. Mr. Dunlop mentions, that a soldier fell out of a baggage-waggon; and his head coming in the direct track of the wheel, the whole of the integuments were torn obliquely off from one side, leaving the cranium completely bare. The integuments were replaced, and the extensive lacerations dressed and bandaged. In less than a fortnight, although exposed to the hardships of a march for the first four days after the wound, this man recovered and was able to resume his duty.¹ To take an opposite instance, Sir Astley Cooper was accustomed to mention in his lectures, the case of a lady who had a small encysted tumour removed, by an operation, from the forehead. The wound made was extremely slight, but in three days erysipelalous inflammation came on, and destroyed life.

¹ BECK. p. 328.

There are two sources of danger in wounds of the scalp :
 I. The access of erysipelatous inflammation. II. Inflammation of the occipito-frontalis tendon, followed or not by the process of suppuration. Either of these secondary effects may operate fatally in slight or severe wounds. Neither can be regarded in the light of an unusual consequence of a severe wound of the scalp; but when one or the other follows a slight injury, there is reason to suspect that the patient may have been constitutionally predisposed; and if fatal effects follow, the influence of this predisposition should be considered as a mitigatory circumstance. Bad treatment may likewise lead to a fatal result from a wound, not regarded as serious in the first instance; but how far the responsibility of the aggressor would be affected by a circumstance of this nature, has been treated of in another place.

When the scalp has received a severe blow, a quantity of blood becomes extravasated beneath the integuments, and forms a tumour, which, from its yielding to pressure in the centre, has been not unfrequently mistaken for fracture with depression. A careful examination, together with an attention to the concomitant symptoms, is generally sufficient to clear up the case. A simple fracture of the skull is not of itself dangerous, where the bones have not been separated: but it is rare that a fracture of the bones of the cranium is witnessed, without being complicated with concussion, extravasation of blood, or subsequent inflammation internally, to either of which consequences the danger must be assigned. It is necessary to observe, that a fracture does not always take place at the spot which receives the blow: it is often seen in a distant part of the skull. Thus a blow on the vertex, when sufficiently severe to produce fracture, often causes the bones to separate at the base of the skull, rather than in the immediate neighbourhood of the spot where the violence was inflicted. These counter-fractures, as they have been called, are chiefly seen in cases in which the violence has been applied to the cranium, by a body presenting a large surface. They are almost always situated at a point diametrically

opposite to that part of the cranium which was struck ; because it is at that point of the osseous cavity that the diverging forces become concentrated.¹

Wounds of the head are dangerous, in proportion as they affect the brain ; and it is rare that a severe contused wound is unaccompanied by some injury to that organ. There is, however, a difficulty which the practitioner has here to contend with, namely : that it is scarcely possible to predict from the external wound, the degree of mischief which has been produced internally. These injuries, as it is well known, are very capricious in their after-effects : the slightest contusions will be attended with fatal consequences, while fractures, accompanied by great depression of bone, and an absolute loss of substance of the brain, are sometimes followed by perfect recovery. Another difficulty in the way of forming a correct prognosis, consists in the fact, that an individual will recover from the first effects of an injury, but after a short time, he will suddenly die ; and on examination of the body, the greater part of the brain will be found destroyed by the suppurative process, although no symptoms of mischief may have manifested themselves until within a few hours of death.

The common effect of a violent contusion on the head, is concussion or extravasation of blood, or both. In concussion, the symptoms come on at once, and the patient, if severely affected, sometimes dies without any tendency to reaction manifesting itself. But the period at which death takes place is liable to vary : a man may die on the spot, or he may linger in a state of insensibility several days, and in either case, after death, no particular morbid change may be discovered. It is necessary, in a surgical point of view, to distinguish between concussion and compression. The latter may arise from several causes, and prove fatal unless the symptoms are relieved. A frequent cause of compression in injuries to the head, and one that presents important applications in medico-legal practice, is *extravasation of*

¹ DEVERGIE. Méd. Lég. Tome II. p. 214.

blood, an effect which may take place either with or without fracture of the skull. In a case of pure compression, arising from extravasation of blood, the comatose symptoms come on gradually: at first, indeed, the patient often speaks of himself as but little injured. More commonly, concussion, and compression from extravasation of blood, are combined: here the prognosis is extremely unfavourable.

Blood may be found extravasated in various situations within the interior of the cranium: and the cause of the extravasation may be either disease or violence. The skill of a medical jurist is often required to determine which of these causes is the more probable, as where, for instance, a pugilist has died after having received severe injuries to the head, and his adversary is tried on a charge of manslaughter. On these occasions, it is the object of the counsel for the prisoner to draw an admission from a medical witness, that the fatal hæmorrhage arose either from a diseased state of the vessels of the brain; or, if the evidence render it probable that the blow was the cause of it,—that the effects of the blow were aggravated by the diseased state of the vessels, or by the excitement into which the deceased was thrown.

Among the cases referring to this part of our inquiry, I shall select the following.

Thomas Ready, and Michael Mullaney, were indicted for causing the death of Edward Thompson.¹

It appeared from the evidence of many witnesses, that the prisoner, Ready, was second to a man with whom the deceased fought; while Mullaney was a by-stander, who, with others, interfered when he saw that the deceased was getting the better of his antagonist. Several witnesses swore, that, after a few rounds, the prisoner, Mullaney, broke into the ring, and struck Thompson with a stick on the back of the head. Thompson staggered, but the blow did not knock him down. One witness deposed that, about this time, the deceased's antagonist struck the deceased a blow in front, but apparently not sufficient to cause him to

¹ Old Bailey Sessions, Sept. 1833.

fall ; although he instantly fell back on some uneven turf. The deceased was then carried off the ground in an insensible state.

The first medical witness who was called, deposed that the deceased was brought to his house, about four o'clock on the afternoon of Tuesday, July 9th. There were the marks of severe bruises on the head, loins, and arms. Witness bled him by opening the temporal arteries, and he abstracted about three pints of blood. Leeches were then applied, and ten ounces more were procured. An embrocation was afterwards prescribed for the chest, and a blister was applied to the nape of the neck. The deceased did not rally : he continued insensible, and died on the Friday morning, July 12th. Witness was present at the post-mortem examination. There was no fracture of the skull : the dura mater was healthy. On the left side there was some coagulated blood, and on removing the coagulum it was found that this had proceeded from three ruptured vessels. The brain was healthy, as also the viscera of the chest and abdomen.

By Judge Patteson,—Were there any marks of injury sufficient to cause death ? Witness,—No, not any.

Any bruises on the face ?—Yes, the right eye was swollen and black.

What was the immediate cause of death ?—The rupture of the blood-vessels of the brain, occasioned by falling.

Did you see the blows on the head, and were they likely to have caused the injury within ?—No ; and that was the reason why I attributed the bursting of the vessels and consequent extravasation of blood to a fall.

This witness underwent a severe cross-examination by the prisoners' counsel. He said he did not think that the rupture of the vessels was occasioned by the deceased's violent exertion, in a fight of one hour and three-quarters ; although such violent exertions might have sufficed to cause death. The vessels of the brain were much congested. The fall must have been violent ; but as the deceased fell on the grass, there would be no external marks on the head. He thought the effects of violent passion on the brain would

be manifested by a rupture of the large, and not of the small vessels of the organ.

A second medical witness was then examined: he deposed that he saw the deceased on the Tuesday, in company with the preceding witness and another surgeon. There appeared to have been a violent blow on the head, the scalp being swollen and raised, but the skin was not broken. He distinctly felt the swelling, and saw it through the hair; it was about the size of a half-crown piece. The other blows about the person were severe, but not any of them were sufficient to cause death. The bruise on the head principally attracted witness's attention; in his opinion it was produced by some hard body, and not by a blow of a fist or a fall, unless the head had fallen against a round stone. Witness attended the inspection of the body; on removing the scalp, there was the mark of a severe bruise beneath. The dura mater and brain were healthy,—the quantity of blood, extravasated from the three ruptured vessels, amounted to as much as two ounces. The marks of violence within, were immediately under those on the outside of the cranium. The deceased died from rupture of the blood-vessels, and that rupture was occasioned by external injury. Violent excitement would suffice to cause congestion of the blood-vessels. In his opinion, it was not judicious to open the temporal arteries, and remove three pints of blood.

Prisoner's Counsel.—Can you take upon yourself to say, whether the deceased died of the injuries to the brain, or of the improper remedies applied? Witness,—The deceased must have died under any circumstances. The witness was again pressed with the question, and he then said, although he thought that the abstraction of so much blood was improper, yet, if the surgeon knew of the internal injury, he had acted rightly. He also confessed that he was then in his apprenticeship, and that he had not made himself perfectly acquainted with the subject.

In the defence, the prisoner, Mullaney, declared his innocence, and several witnesses were examined, who affirmed, that although in his company at the affray, they

did not see him strike the deceased, or interfere in any way. Both of the prisoners received good characters. The judge, in charging the jury, said, if they were satisfied that the deceased had died of the injuries received during the fight, and that the prisoners were assisting, then they must find them guilty of manslaughter. The punishment to be awarded would be another question, because no offence differed more in degree than manslaughter, being sometimes a very heinous, and in other instances almost a venial offence. The prisoner Ready was found guilty of manslaughter, but Mullaney was acquitted.

In this case, concussion appears to have been combined with extravasation of blood, and the immediate cause of death was sufficiently manifest. Whatever opinion might be formed respecting the propriety of abstracting so much blood from the deceased, still it was impossible to ascribe death to this circumstance: and the witness who made the objection, which the prisoner's counsel was so ready to seize on, removed the whole force of it, by the acknowledgment of his want of experience on the subject. The chief medico-legal question in the case related to the *cause of the extravasation of blood*. It was improbable that this should have arisen from cerebral excitement, notwithstanding the attempt of the counsel to refer it to this cause. Excitement may produce congestion, and, in some rare instances, extravasation; but we must not be too ready to refer all extravasations of blood to simple excitement of the cerebral circulation. In Thompson's case, the extravasation was doubtless owing to a blow: the appearance of a tumour externally, and the effusion corresponding in situation internally, strongly bear out this view; but whether the blow was owing to the deceased having been struck by a stick, or to his having fallen violently on that part of his head, it is not easy to determine. The appearances might have been accounted for on either supposition; and the evidence was so conflicting respecting the conduct of the prisoner Mullaney, at the fight, that the verdict of the jury was such as we might have expected. One of the medical witnesses positively attributed the marks of violence about

the head to a fall; but there was nothing in the medical evidence which rendered it improbable that the injury might not have been caused by a stick, such as the prisoner was alleged to have used.

In some instances an attempt will be made to refer death to apoplexy.

Mary Fagent and John Fagent were tried for the manslaughter of the wife of the latter.¹

The deceased was an old woman, upwards of seventy years of age. On the evening of the 6th of October preceding, she had a violent quarrel with her husband and the female prisoner. Her husband ordered her to go up to bed, and on her refusing, he struck her on the arm. They afterwards went up stairs together, and were heard quarrelling, when the female prisoner rushed into the room, and was immediately assailed by the deceased, in very abusive language. The female prisoner then struck her violently on the head, with a candle-stick. The deceased was seen by a medical practitioner, who was immediately sent for by the husband; and she made a declaration to him of the circumstances. She was perfectly sensible at this time, but the next day she became insensible; and continued so until her death, which took place on the 24th of October, eighteen days after the receipt of the violence. On inspection of the body, a quantity of bloody serum was found at the posterior part of the head, where the violence had been inflicted. The medical witness attributed death to apoplexy, and he thought that the blows were sufficient to produce apoplexy; but the effect of this opinion was immediately neutralized by his admission that irritation and passion might also have produced the apoplexy *without the blows*. On this evidence, the prisoners were instantly acquitted.

Here the reader will perceive that what was intended as a *general* answer by the witness, was made applicable to a *particular* case. There is no doubt that irritation and passion may produce apoplexy without blows: but in this instance the coming on of the insensibility so soon after the violence,

¹ Home Circuit, Kingston, March, 1835. Before Mr. Justice Gaselee.

and the nature of the violence itself, on an aged person, with no appearance of recovery during the time she survived, were circumstances surely sufficient to prove that the blows must have been very closely concerned with the production of the symptoms. Can it be inferred from the facts stated in evidence, that the death of the deceased was not accelerated, if not absolutely caused by the violence? Or can it be supposed that the deceased would have died at the same time, and under the same circumstances, if the blows had not been inflicted? These are serious questions, and we should take care in answering them, on similar occasions, that we do not abandon what is probable, for that which is remote and speculative.

When an individual is in a state of excitement, it sometimes happens that a very slight degree of violence to the head is sufficient to produce serious results.

George England was indicted for killing and slaying his wife, Mary England.¹

From the evidence of the daughter, it appeared that the prisoner had quarrelled with his wife, and that he pushed her from him, but without much violence. The floor was uneven, her foot slipped on some sand, and she fell with her head on a broken piece of flag-stone. The deceased was at the time in a violent passion. The wound produced by the fall bled considerably: she was immediately taken up, but did not speak; she remained in an insensible state until she died, which was in about an hour after the fall. The prisoner was extremely distressed, and lost no time in sending for medical assistance.

The medical witness stated that he saw the deceased about five minutes before her death; she was perfectly insensible. On inspection of the body, it was found that there were marks of external violence on the skull, but the skull itself was not fractured; there was also a considerable quantity of blood extravasated on the surface of the brain. A fall would, in his opinion, account for the appearances met with; but he admitted, on re-examination, that the deceased had a black eye, which could not have arisen from a fall on the

¹ Northern Circuit, Durham, February, 1833. Before Mr. Baron Gurney.

back of the head. The prisoner, in his defence, said that he gave the deceased only a slight push, and she fell in consequence of the unevenness of the floor. The jury returned a verdict of manslaughter, and a very mild sentence was passed on the prisoner.

In this case, the connection of the extravasation with the blow, was clearly made out ; but the extravasation was probably, in great part, to be ascribed to the very excited state of mind of the deceased, at the time of the accident.

The most difficult cases, however, which the medical witness can possibly have to encounter, are unquestionably those in which, together with passion, we find excitement from intoxication co-existing at the time a blow is received. These cases require great consideration on his part, as it is the uniform practice of barristers to endeavour to make it appear to a jury, that intoxication and mental excitement have more to do with the extravasation of blood than the blow inflicted by a prisoner whom they are engaged to defend. There can be no objection to the success of such attempts,—and that they are commonly successful, the records of our Courts will sufficiently testify,—so long as the inferences by which they are supported are based on well-founded experience and observation, and are not opposed to the medical facts of the case. Dr. Beck observes that, as a general rule, he would always lean to the side of the accused. The habitual use of spirituous liquors, in his opinion, is so apt to produce a diseased state of the system generally, that unless positive malice be proved, we shall best promote the ends of justice by considering the offence of a secondary nature.¹ The application of this humane rule must not, however, be carried too far ; for it would frequently lead to the acquittal of the guilty. In a case in which, after very deep and mature reflection, positive doubt remains on the mind of a witness, as to whether the extravasation arose from the intoxication or the blows, he is certainly justified in leaning to the side of an accused party, where a contrary

¹ Med. Jur. p. 324.

opinion would infallibly lead to his condemnation : but it unfortunately happens that an opinion favourable to the accused, is generally extracted by a cross-examination, in which the answers of the witness are often made to bear an interpretation that he himself could not have intended. Among the cases which may serve to illustrate this subject, I shall first select that of Owen Swift, who was indicted for killing and slaying Anthony Noon, at Andover.¹

There was a prize-fight between the parties ; and it appeared, from the evidence, that the greatest provocation was given by the deceased to the prisoner. The fight lasted about two hours : and half an hour before the last round, the deceased fell with his head very heavily against a stake of the ring. In the last round he was knocked down, and again struck his head in falling. He then became insensible, was removed from the ground in this state, and died the following day.

The first medical witness deposed, that he saw the deceased soon after his removal from the ground : he was perfectly insensible. He observed several marks of violence about the head, and the deceased appeared to be suffering from pressure on the brain. In answer to the questions put on cross-examination, he said,—that there was no particular bruise on the head. The brain may be affected by excitement ; and the rupture of a vessel would suffice to produce insensibility. There may be a rupture of a vessel on the brain, *without a blow* ; for such an effect may follow from *mental excitement only*.

The second witness gave the same general evidence with regard to the appearances of the body. The scalp, he said, was thickened in one part, which showed that the head must have received a violent blow. On opening the cranium, it was found that large quantities of blood had become effused in all directions. He attributed death to pressure on the brain, from extravasation of blood ; and he considered that this extravasation had been caused by external violence. On cross-examination, this witness admitted that the

¹ Western Circuit, Andover, July, 1834. Before Mr. Justice Patteson.

extravasated blood was not confined to any one spot in the brain. Blood-vessels may be ruptured by *violent excitement*. Violent exertion, combined with extreme heat of the weather, and the drinking of spirituous liquors, would produce such symptoms as those witnessed in the deceased; and such a degree of excitement as would suffice to cause death. A fall might occasion the rupture of a vessel: he found it difficult to arrive at an exact conclusion as to the cause of death in this case; but he preferred attributing it to the blow, rather than to the other circumstances.

By the Court,—There was only one vessel ruptured, and if a person had been in a violent state of passion and excitement, only one vessel would probably have been ruptured. He believed that death could not be attributed to one particular blow.

Another surgeon stated, that the excitement of mind would have assisted the mortality of the blows. The jury found, that the blows inflicted on the deceased were the cause of death; and returned a verdict of manslaughter against the prisoner.

In reviewing the medical evidence in this case, we learn that the deceased died from concussion and extravasation of blood on the brain. The chief medico-legal question related to the cause of the extravasation. The prisoner's counsel endeavoured to refer this to the excitement produced by passion, by the drinking of intoxicating liquors, and extreme heat of the weather: but there cannot, I think, be a doubt, medically speaking, that the extravasation was produced by the violent injury to the head; and all that can be said of the state of mental excitement under which the deceased laboured, was, that it might have added to the degree of extravasation, or increased the tendency to it. But it may be fairly asked,—was not the *violence*, upon the evidence, sufficiently great to account for the extravasation of blood on the brain, without the supposition of any co-existing excitement whatever? And would it be considered any thing unusual, in the common course of things, that fatal extravasation should be produced on the brain of an individual exposed to violent falls and blows, although

he had laboured under no excitement at the time? Again, even if it be admitted, that the rupture of a blood-vessel and extensive extravasations on the brain may take place from simple excitement and passion; yet this is an event comparatively rare,¹ while nothing is more common than that these effects should follow violent injuries to the head. Why, then, when an obvious cause exists, are we to fly to one which is itself only within the range of possibility? The medical witness should remember that, on these occasions, if he is unable to say *positively* whether the extravasation were due to the excitement or the blows, he will satisfy the Court if he only state clearly that which is, in his own mind, the *more probable* cause: and by weighing all the circumstances of the case accurately before-hand, he will scarcely fail to find, at least in many instances, that one cause was more probable than the other. Thus, if a man, excited by passion and intoxication, is struck on the head, and the blow is very slight,—such as an unaffected person would probably have sustained without injury; yet in this case insensibility and death follow, and, on examination, a quantity of blood is found extravasated on the brain,—can it be a matter of doubt with the practitioner, that the extravasation was chiefly due to the excitement under which the deceased was labouring? To take a converse instance,—a man, moderately excited in a personal conflict with another, is struck most violently on the head, or falls with great force on that part of the body,—this is followed by fatal extravasation on the brain, and it would be no unexpected consequence of such violence that a similar appearance should be met with in an individual calm and unexcited,—can the practitioner hesitate to say that, in this instance, the blow would satisfactorily account for the extravasation,

¹ Numbers of persons are daily exposed to causes which excite them, and rouse their passions to the highest degree of intensity, yet in how many of such cases, does this state of extreme passion and excitement prove fatal, by causing extravasation of blood on the brain? When this question is answered, let the medical jurist consider, in how many of a given number of persons, who have been exposed to severe blows or falls on the head, followed by death within two or three-days, extravasation is not likely to be met with.

without reference to any co-existing causes of excitement? These may be allowed to have their influence in giving an increased tendency to cerebral hæmorrhage or in aggravating the consequences of the blow, but no further; and he who permitted a counsel to make use of his evidence, in cross-examination, in a manner to lead the jury to believe that excitement was as much the cause of death as the blow, would, in my opinion, neglect the high and important duties which he is called upon to fulfil as a medical jurist.

In the case just now related, the witnesses very fairly attributed the extravasation to the blows, and very properly admitted that the excited state of the deceased might have aggravated their effects; but the cross-examinations afford a very instructive example of the systematic course pursued by a prisoner's counsel in these criminal investigations. When examined in chief, a witness, perhaps, asserts that the extravasation of blood was owing to the blow inflicted on the head. He is then asked by the counsel who cross-examines him, whether vessels may not be ruptured by excitement: the witness answers at once in the affirmative, and thus unconsciously produces an impression on the minds of the jury, that excitement may have caused the rupture of the vessel *in the particular case* on which he is being examined. This is precisely the sort of answer which the prisoner's counsel wishes to extract from the witness; and the effect produced by it on the Court; is not often removed, even by a careful re-examination. The counsel for the defence is well aware that, in a case of this description, his only chance of obtaining an acquittal for his client, is to throw a degree of doubt on the medical evidence; and to render it probable to a jury, that the death of the deceased party was due to some other cause than the blow inflicted by the prisoner. It is very proper that a skilful barrister should exercise his talents in this way, but it is at the same time no more than just that a medical witness should be forewarned and forearmed for the kind of examination which he is about to undergo. Now, the manner in which I should recommend a witness so situated to conduct himself, would be, that he should give a *qualified*

answer to what is really a *general* question; and, supposing that his opinion is already formed on the subject on which he is giving evidence, he should not, unless it be strictly consistent with his own views, allow his answer to a *general question* to be made applicable to a *particular case*. If then asked, in cross-examination, whether vessels might not be ruptured and blood extravasated by excitement, he should answer that such an effect might undoubtedly follow: but that it was his opinion,—and I am here supposing that this opinion has been founded upon a deliberate examination of all the medical facts,—that excitement was not the cause of rupture and extravasation in *the case in question*. If the prisoner's counsel endeavour to stop the witness from thus qualifying his answer, he has a right to claim the protection of the Court, and to insist that his evidence shall pass to the jury without having any ambiguity attached to it.

This subject is of such importance in the practice of medical jurisprudence, that I consider it will be no waste of space to detail a few more cases, in which questions relative to the causes of cerebral extravasation have arisen.

Sir Charles Bell has recorded the following case, in which he was immediately concerned as a witness. An industrious man, returning home from his work, found his house empty and the furniture and tools of his trade sold by his wife, who was a drunken dissipated woman. Incensed at his wife's conduct, he struck her while she was in a state of intoxication, and ordered her to go up stairs to bed. No one was present, and we have only the husband's account of her death. He said that after he had given her the blows, she fell from a chair on which she was sitting, and he then threw her on the bed, conceiving that she was in a fit, such as he had often seen her in before. Some of her neighbours, on coming in, found that she was dead. The man was afterwards tried at the Old Bailey for murder; and Sir Charles Bell, who had examined the body of the woman, was called upon to give evidence respecting the cause of death. He stated, that on opening the cranium, he found that the anterior artery of the cerebrum on the left side had been

torn half-way across, and a large quantity of blood had become extravasated, which accounted satisfactorily for her death. When asked respecting the cause of the rupture, the witness said, that there might be a state of the vessels, in which an external injury or shock would be very apt to produce laceration of the blood-vessels :—this state might be supposed to be that of artificial excitement, induced by long-continued habits of intoxication. On being questioned as to whether he thought the blows had caused the rupture, he said he conceived it very likely that the shock of a blow would rupture a vessel ; and being then asked whether he supposed that the woman was more likely to have a vessel ruptured from her having been intoxicated at the time,—he was of opinion that the intoxication and the struggle would produce such a state of activity in the circulation of the head, that a degree of violence would suffice to cause a rupture which, under other circumstances, would have given rise to no serious mischief.

The view taken by the witness, in the above case, was such as a cautious medical jurist, who leaned to neither side, would have taken. The blows inflicted by the prisoner, appear to have been so slight, that probably no fatal consequences would have ensued, but for the cerebral excitement, under which the deceased laboured from continued habits of intoxication.

On the 16th of July, 1831, Dr. Christison and Mr. Watson were required to inspect the body of Mrs. Mc.Cormick, in order to report on the cause of her death.¹

This woman had lived unhappily with her husband and a daughter of his, by a previous marriage. They were all much addicted to intemperance, and were people of low character. Mc Cormick had served in the army, for which he received a pension ; but unfortunately when this was paid to him, he could not refrain from drinking to intoxication, so long as it lasted. His conduct at such times, towards his wife, was very outrageous, beating and kicking her severely, and in this his daughter joined him. On the day previous to the death of his wife, he had been seen by several neighbours to

¹ Medical and Physical Journal. Vol. XIII. p. 165.

beat and maltreat her, giving her severe blows with his fist on the head and face. In the evening, she took refuge at the house of a neighbour, to whom she complained much of her head, and declared that the two prisoners had nearly murdered her. On the next morning, she was seized with convulsions and coma, of which she died in a few hours. At the time she died, the husband and daughter, who were present, accused each other, in the hearing of several witnesses, of having murdered the deceased.

On an inspection of the body, say the examiners, we found several marks of recent contusions on her head, face and arm. The skull, which was throughout three-eighths of an inch in thickness, being about three times the thickness of ordinary skulls, was not fractured. A slight bloody effusion covered the upper part of the right hemisphere of the brain, beneath the dura mater. At the anterior part of the middle lobe of the brain on the right side, there was a pretty thick coagulum of blood, which when removed, appeared to amount in quantity to about half an ounce. The substance of the brain was firm and vascular; the lungs and heart natural,—the latter, which was coated with fat, contained no blood; the arteries were natural: the kidneys small and much diseased, having a mottled appearance and being changed in structure: the urine presented coagulated flakes on boiling. The ovaria were enlarged, and converted into cysts filled with watery fluid.

The report upon the case, stated that the examiners had found several marks of contusion on the face, head, and other parts of the body, with an effusion of blood upon the brain sufficient to have occasioned death; but that it was impossible to say whether the effusion of blood had arisen from violence, or from natural disease. It was also mentioned, that other parts of the body were in a state of disease, but not of a nature to have caused sudden death.

At the trial of Mc Cormick and his daughter for the murder of his wife, the case rested entirely on the medical evidence. Habitual maltreatment, and blows on the day before her death, were clearly proved against them. But the chief medico-legal question was, whether the effusion of

blood, which had caused her death, had been produced by violence, or had arisen from natural disease and intoxication. Several circumstances, says the reporter of the case, strongly concurred to favour the conclusion of violence as the cause. These were :—

I. The infliction of severe blows on the head just before the occurrence of the fatal symptoms, sufficient to have occasioned the effusion of blood on the surface of the brain.

II. The external marks of violence on the head.

III. Effusion of blood from natural disease rarely takes place on the *surface* of the brain ; and seldom at all without disease either of the brain or of its arteries.

IV. The symptoms and appearances were precisely those which might have been expected to follow such blows, as the woman was proved to have received.

In giving their evidence, therefore, they concurred in opinion, that the fatal effusion of blood on the brain, was *more probably* owing to the violence inflicted, than to natural disease.

“We gave this opinion,” continues the reporter, “as medical jurists, called upon to aid impartially in the development of the case. The opinion could not have been of a more decided character, on account of the drunken and irregular habits of the deceased ; and the public prosecutor, with that laudable humanity and moderation, which always characterize the administration of the laws of our country, departed from the charge of murder, in consequence of our professional opinion being uncertain. But, when taken along with the general evidence, which was very strong against the prisoners, the propriety of the decision come to, may be fairly questioned. There were several direct proofs of violence, but none of natural disease having occasioned death. The conclusion seemed almost irresistible, but this was for others to decide. We performed our duty by stating the facts, our opinion, and the doubt which attended the case. The jury, however, had no alternative ; they found both panels guilty of aggravated assault, and they were sentenced to transportation for fourteen years.”

The only remark which I shall make on the above

report is, that while it presents to us the difficulties which those, engaged in such investigations, may expect to meet ;—it shews clearly the line of duty which the medical jurist has to follow. If he cannot speak with certainty, as to the real cause of an effusion of blood in these cases, let him inform the Court which of the two causes is, in his opinion, the more probable,—the excitement or the violence. A proper use will be made of the implied doubt in his evidence when sentence is passed on the prisoner, should the jury return a verdict against him : but let the witness by all means endeavour to prevent his evidence from appearing before the jury in an ambiguous light,—let it be seen that he has carefully weighed all the circumstances of the case in his mind, and that his opinion is based upon a mature consideration of these.

As a contrast to the above case, I shall select another, reported by a learned and accomplished barrister, to whom the profession is indebted for many interesting medico-legal observations.¹

In a trial for manslaughter which recently took place at Derby, it was proved that the prisoner and deceased had been wrestling. The prisoner had thrown the deceased *with his head on a stone-floor*, by an underhold from the thigh ; he then seized the deceased by the throat, *and beat his head several times against the floor*. This was about ten o'clock on the Friday night, and the deceased died at five in the afternoon of the following day. The body was inspected on the Monday. On removing the scalp, a great quantity of coagulated blood was found between it and the skull. There was a wound over the right parietal bone, an inch and a half in length, penetrating through the scalp ; but no fracture of the skull. There was a quantity of extravasated blood on the opposite or left side of the head ; and a rupture of some branches of the carotid artery inside of the skull. On the neck were two discolourations to the left of the trachea, apparently occasioned by the pressure of two fingers. The laying hold of the neck might, in the opinion

¹ PROF. AMOS'S Lectures on Med. Jur. Med. Gaz. Vol. VIII. p. 582.

of the witness, have more readily caused a rupture of the cerebral vessels, by preventing the return of blood. The surgeon, after giving this description of the post-mortem appearances, was asked whether, in his opinion, *death was occasioned by the injury proved in evidence.* He said death might or might not have been occasioned by it. Death might have arisen from other causes,—*an apoplectic fit might have occasioned it.* The effusion of blood had occasioned death, and he had seen blood in the heads of persons dying from apoplexy. “The deceased,” said the witness, “when I was first called to him, was not able to see,—this was on account of the pressure of coagulated blood on the optic nerves. The occasion of death was the pressure of coagulated blood upon the brain. I am not able to speak to the *cause* of the rupture in the brain. I should think it *highly probable that the injury received was the cause of death,—it was certainly sufficient to account for it.*” The judge severely censured the witness, *for not stating at once that he believed the injury was the cause of death.* It is not mentioned whether the man was found guilty upon this evidence, or whether the jury acquitted him.

The learned reporter, in commenting upon the medical evidence in this case, observes—“the witness might have said the blows were a sufficient cause to have accounted for the death; but that apoplexy also, brought on by great excitation and drunkenness, was a sufficient cause, and the appearances within the head would be the same from either (which of the two, however, was the more likely cause, under the circumstances, to have occasioned death, is not so much a medical question as an inference to be drawn by the jury from the evidence of the witnesses); the utmost the surgeon could say, would be—here is a cause sufficient to account for the death: still the death might have been occasioned by another cause; and whether that other cause existed or not, it is quite impossible for me to say.”

Let it be granted that excitation and drunkenness will produce apoplexy, and that the post-mortem appearances in the head will be the same whether death ensue from apoplexy or from blows: still, can a surgeon hesitate to

admit, that the evidence in the above case proves that the violence was not merely the most probable, but the immediate cause of death? A man is forcibly thrown with his head on a stone-floor, his head is beaten several times against the floor, after he has fallen; and this violence has sufficed to produce a lacerated wound of the scalp, with considerable extravasation of blood beneath. But to explain the extravasation internally,—are we to suppose that the deceased is about this period seized with apoplexy, in consequence of his having been drunk and excited, and that this as satisfactorily accounts for death as the blows on the head? Let us imagine that, instead of a trial for manslaughter, it had been a trial for murder: it is proved, in evidence, that the deceased was drunk and much excited,—the prisoner maliciously and without provocation, throws the deceased with his head on a stone-floor, then beats it violently against the floor: symptoms of cerebral disturbance come on, and the man dies in twenty hours. Serious marks of violence are found on the skull, and extravasation is met with in the brain after death. Could any surgeon conscientiously swear that apoplexy was as *sufficient* a cause of death, in such a case, as the violence? Or if he did so swear, is it likely that any Court of Justice would acquit a prisoner of having occasioned the death of the deceased upon so remote and hypothetical an explanation? The fact is, there are some cases of this description, in which all probability may become violated; and it is surely not to be admitted that a witness is ever justified in suggesting to the Court at the same time, a probable and an improbable cause of death. To take, what appears to me to be a parallel instance: A man is proved to have had arsenic administered to him,—he dies under symptoms of acute gastritis, and, after death, the stomach is found inflamed. Would any medical witness, with a knowledge of the effects of arsenic, and that arsenic had been taken in the case in question, be justified in swearing that idiopathic acute gastritis might have supervened, and that it was as sufficient a cause of death and the morbid appearances, as the arsenic proved to have been taken? Or we will suppose the poison administered to have been opium, and the individual, of apoplectic diathesis,

to die comatose,—the brain presents the appearances seen in apoplexy :—is it for the surgeon, in such a case, to suggest to the Court, that death might be as satisfactorily accounted for by the simultaneous occurrence of apoplexy from disease, as by the poison which the prisoner administered? It appears to me that if he were to give such evidence in either of the cases, he would gratuitously throw ambiguity upon what in itself is sufficiently clear.

In reference to the case of manslaughter, just now quoted, we may ask—Was not the violence *sufficient* to cause death under the same symptoms and post-mortem appearances within the same period of time, in an individual *perfectly sober and unexcited*? This question, I apprehend, would undoubtedly be answered in the affirmative by a reflecting surgeon, whatever opinion he might otherwise entertain respecting the possible aggravation of the symptoms and increased tendency to extravasation from excitement and drunkenness. Again, is it at all probable, that the drunkenness and excitement, *without the violence*, would have been sufficient to cause death, under the same symptoms and post-mortem appearances, and within the same period of time? If, as I apprehend it ought to be, this question were answered in the negative, the course which the medical jurist should pursue in these investigations will be at once apparent. The advice given by Prof. Amos, that the witness should state to the Court “that although the cause mentioned was sufficient to account for death, still the death might have been occasioned by another cause,” is of course only applicable to those cases, in which, without any violent *medical improbability, death might have proceeded from either.*

Professor Amos states, that “which of any two causes is the more likely, under the circumstances, to have occasioned death, is not so much a *medical question*, as an inference to be drawn by the jury from the evidence of the witnesses.” With all deference to the opinion of the learned counsel, I must take the liberty of observing that the determination of the probable cause of death is a purely *medical* question, and one which, in disputed cases, can never be solved

except by medical skill and experience. When two causes of death co-exist in a wounded body, and it is *doubtful* whether death was occasioned by the act of the prisoner, or by some other cause, then this forms a question of fact for the jury.¹ But when, in the judgment of a practitioner, the cause of death is *not doubtful*, it can no longer be a question for the jury, although they may disbelieve the medical evidence, and return a verdict directly opposed to it. In proceeding upon any other principle, it may be inquired,—What would medical evidence become, if it were not in the province of the witness to ascertain which has been the more likely cause of death? Or why are surgeons summoned on trials for murder and manslaughter, unless to guide a jury in subjects on which they cannot possibly be informed?

The following interesting and instructive case was communicated to me by Mr. Giles, a dresser of Guy's hospital.

A seaman of the name of Cole was admitted into the hospital on Sunday night, August the 10th, 1834, in a state of insensibility. Those who brought him reported that while engaged in a scuffle with several persons, he had been severely injured on the head. It was also stated, that he had previously been drinking porter. On examination it was found that there was the mark of a blow over the right eye, but no fracture of the skull. The pupils were obedient to light. He vomited occasionally a liquid which smelt like porter;

¹ Such is the opinion of some of our best legal authorities on evidence. Vide STARKIE on Evidence. Vol. II. p. 946. It is not hereby implied that a medical witness is to dictate to a jury the verdict which they are to return. When there is a doubt on his mind, he leaves the decision to them; but when there is no doubt on his mind, he plainly states as much, without being in the least influenced by the decision to which they may come. A verdict may be returned against evidence of the cause of death, of the most plain and convincing description (vide case page 304), but this neither reduces its value nor impugns its correctness; and the course pursued by the medical witness, is as much a matter for future guidance as if the case had not been tried. At the same time it cannot be denied, that what is *medically probable*, may not always be *legally proved* to the satisfaction of a jury!

but in the course of the night, the vomited matters assumed a bilious character. The man could not be roused to answer questions.

From the circumstance of his having taken a quantity of porter, and no serious marks of violence existing, it was considered most probable that intoxication was the chief cause of the symptoms. On the next day (Monday) he was so much better that he could understand what was said to him, and could answer when spoken to. He complained of feeling drowsy, and of suffering from a severe head-ache. Purgative medicines were ordered, and he was bled from the arm, by which he felt himself much relieved. On the Tuesday, he appeared much better; and on Wednesday the 13th, he felt so well, that he went out of his own accord. He returned to his ship; and died suddenly on board the vessel about four hours after he had left the hospital. All that could be learnt of him after his leaving the hospital was, that he had taken some spirits and water on his way to the ship; and that just before his death, his breathing became very loud,—from the description of those who were present, stertorous.

The body was examined on the Thursday, about twenty-four hours after death, and the following appearances were met with. On the scalp, there was a considerable bruise, covering a superficies of three square inches. The bone beneath was not much affected, and no trace of fracture was observable. On opening the cranium, there was seen in that part of the pia mater corresponding to the seat of external injury, a very slight extravasation of blood. The substance of the brain was more vascular than in the ordinary state, but it was otherwise healthy. The lateral ventricles contained serum mixed with blood, and a small quantity of the colouring matter of the blood was deposited on the lower boundaries of these cavities. There were clots of blood in the third and fourth ventricles, and a lengthened clot was observed in the course of the vena Galeni. At the basis of the brain, a large coagulum of blood was found, extending from the junction of the optic nerves to the medulla oblongata. This coagulum appeared to be continuous with that

contained in the third ventricle, the floor of which was slightly lacerated.

A coroner's inquest having been held, a verdict of manslaughter was returned against six persons, who were proved to have been concerned in the affray, in which the deceased received the injuries to his head. The case was tried before the Recorder, at the Central Criminal Court, in November, 1834.

On the trial, the evidence of the witnesses went to shew, that death was caused by extravasation of blood on the brain, which they attributed to the external violence. The prisoners' counsel in cross-examination asked, whether the extravasation of blood might not be ascribed to apoplexy, brought on by intoxication. The witnesses very properly answered ;—although they could not deny that extravasation might result from the excitement produced by intoxicating liquors, and that intoxication might have been, at least in part, a cause of the symptoms in the present case, it was in the highest degree improbable, that it should have produced the fatal extravasation met with in the brain of the deceased. They also asserted, that it was not very probable from the post-mortem appearances, that the deceased would have recovered had he remained in the hospital instead of going to his ship. The prisoners' counsel then inquired, whether, as intoxication was admitted to have had a share in the production of the symptoms under which the deceased laboured, it were possible to distinguish between the effects of concussion and intoxication. The witnesses replied in the affirmative, and the case for the prosecution closed.

The Recorder, in summing up, said, that the medical evidence appeared to be conclusive as to the cause of death ; and, although the counsel for the defence had acted correctly in endeavouring to account for death by referring it to intoxication, yet he thought, when severe blows were proved to have been inflicted on the vertex, and a corresponding extravasation of blood, such as was known by experience to follow external violence, was discovered at the base of the brain ; *these must be, beyond all doubt, regarded as cause and effect.* Had there been no blows, the

case would have been very different. A verdict of manslaughter was returned against all the prisoners.

As in the above case, a witness may be asked whether he can distinguish between the effects of *concussion* and *intoxication*. The history of the individual will sometimes suffice to establish a distinction, but this cannot always be obtained. It is commonly said that the odour of the breath will detect intoxication; but it is obvious that a man may meet with concussion after having drunk liquor insufficient to cause intoxication, or concussion may take place while he is intoxicated, as in the seaman Cole. Under such circumstances, we must wait for time to develop the real nature of the case; but concussion may be so slight, as sometimes closely to resemble intoxication; and in the absence of all marks of violence to the head and the existence of a spirituous odour in the breath, the medical examiner might be easily deceived. Or, on the other hand, intoxication may be so great as to give rise to the apprehension of fatal consequences, and the co-existence of a mark of violence on the head, might lead to error in the formation of an opinion. What is the line of conduct to be pursued on such occasions? The examiner should weigh all the circumstances, and if there be one cause for the symptoms *more probable* than another, let him adopt it:—if not, let him give the benefit of the doubt to the accused party. It is better that ten guilty men should escape, than that one, who is innocent, should suffer!

It must be remembered, that in cases of injuries to the head proving fatal by extravasation of blood on the brain, an individual may recover from the first effects of the violence, and apparently be going on well, when he will suddenly become worse and die. Extravasation takes place slowly at first,—it may be arrested by a portion of the blood coagulating around the ruptured orifices of the vessels, or by some other mechanical impediment to its escape; but after a longer or shorter period, the hæmorrhage will recur and destroy life by producing compression. In Cole's case, the quantity of blood extravasated might

have been small in the first instance, which would account for his apparent recovery on the two days following the accident; but the exercise, and consequent excitement, might have given rise to a sudden additional effusion, sufficient to destroy him. How many hours or days, after an accident, are required in order that such an increased effusion should take place, it is impossible to say; but in severe cases, fatal extravasation is observed to follow the injury within a very short time. Sir Astley Cooper relates the case of a gentleman who was thrown out of a chaise, and fell upon his head with such violence, as to stun him in the first instance. After a short time he recovered his senses, and felt so much better, that he entered the chaise again, and was driven to his father's house by a companion. He attempted to pass off the accident as of a trivial nature, but he soon began to feel heavy and drowsy, so that he was obliged to go to bed. His symptoms became more alarming, and he died in about an hour,—as it afterwards appeared, from extravasation of blood on the brain.

Concussion may destroy life without producing extravasation. It may operate by causing inflammation of the brain or its membranes; and this will in some instances be a rapid, in others a slow, consequence of external violence. In the latter case, suppuration may take place in one or both of the hemispheres to a large extent: and at a time when there is every apparent prospect of recovery, comatose symptoms come on, and the patient is suddenly cut off. A case is recorded by Smith, in which a woman received a blow on the head from a laundress's iron;—the skull was laid bare, but it was not fractured or injured. By the advice of Cheselden, she underwent the operation of trephining; still no mark of injury about the cranium could be detected. She went abroad about her usual occupations for a fortnight afterwards; and at the end of twenty days from the time of receiving the injury, she died. On opening the head, a very large abscess was found in the middle of the brain, which occasioned some perplexity about the real cause of death. At the trial, the surgeon, who had attended the deceased, was rather inclined to attribute death to the blow; but he would by no means deny, that it might have proceeded from

some inward cause. The deceased, it appeared, had been subject to severe head-aches before the occurrence of the accident. Mr. Cheselden being examined on the trial declared, that he could not conceive how a blow should be the cause of death, where there was no extravasation, and the person could go about for a fortnight afterwards. His allowing, however, observes Smith, that similar appearances were sometimes found in the brains of persons subject to head-ache, was of more importance to the prisoner.¹

The evidence, given by the celebrated surgeon on this trial, must not form a precedent for the guidance of a medical witness of the present day. There is no doubt that a blow on the head may be a cause of death, by giving rise to inflammation and suppuration of the brain, after a much longer time than that stated in the above case; and yet the person might be able to occupy himself with his usual duties until within a short period of dissolution. The insidiousness with which suppuration of the brain may go on, is well illustrated in the case quoted by Dr. Abercrombie, of a man who retained all his faculties until the moment of death, which was sudden: on examining his head, the whole of the right hemisphere of the brain was found destroyed by suppuration.² In fact the annals of surgery abound with cases which will teach the medical jurist that he cannot pronounce a person out of danger who has received a blow on the head, notwithstanding the apparent absence of all mischief, until after the lapse of a considerable time. He must be prepared for a very nice question, which is likely to be put to him when cases of this nature are made subject to a criminal investigation, namely:—How far the abscess was connected with a blow inflicted some time previously, or with natural disease, under which the individual might have laboured before or after the receipt of the violence? Here I cannot help adverting to the length of time, to which a fatal result, from the effects of concussion, may be protracted. Death may not take place until after the lapse of two years, or even of a longer period. Sir Astley Cooper was accustomed to relate in his lectures, the case of a medical man of

¹ For. Med. p. 267.

² On the Intellectual Powers, p. 153.

Yarmouth, who, being present in a mob, was struck by a blow of a stick on the forehead. Symptoms of concussion of the brain resulted, and when the first effects of the shock had passed away, this gentleman suffered much from vomiting and pain in the head. For a considerable time he was subject to frequent vomiting on taking exercise, or on experiencing the least emotion. By the advice of a friend, he underwent the operation of trephining, but he suffered no relief in the symptoms. He continued to become worse, and he died *two years* after the receipt of the injury.

Who could deny, in such a case as this, that death was really caused by the blow? Yet an aggressor, according to the letter of our law (p.303), could not be charged with murder or manslaughter under these circumstances, because the blow did not prove fatal within a year and a day! Could it be said that this gentleman had, at any period after the violence, recovered from its effects?

Fractures of the skull, when accompanied by depression of bone, are usually attended with symptoms of compression; but when a portion of brain is lost, the depressed bone occupying the space of the cerebral substance which has escaped, does not always cause symptoms of compression. Such injuries are highly dangerous; but nevertheless there are extraordinary instances of recovery on record, even where there has been a considerable depression of bone, combined with a great loss of substance of the organ. Those fractures, which involve the base of the skull, are more commonly accompanied by extravasation of blood, than those which are produced in the upper arch of the cranium; and such extravasations, from the large size of the vessels, which are there situated, commonly terminate fatally within a very short period; internal hæmorrhage, however, is not always the cause of death in these severe injuries. Sir Astley Cooper has recorded the case of a female, in whom a fracture took place from the vertex through the sphenoid bone, owing to a shutter having fallen on her head. This woman had no comatose symptoms, and she died after a short time in consequence of inflammation occasioned by the irritation of

the fracture. On dissection, the fracture was found to extend through the basis cranii, so that it divided the skull into two nearly equal portions.

In a case, which has been reported by Sir Charles Bell, fracture of the base of the skull, produced death in a very singular manner several weeks after the accident. On a post-mortem examination, it was found that the fracture had rendered the border of the foramen magnum rough, and that a small projecting spiculum of bone, by a sudden turn of the head, had become forced into the spinal marrow and destroyed life.

The medical jurist must not forget, that fractures may take place internally without any breach of continuity being seen on the external parietes. Thus a blow on the skull may cause a fracture of the internal table, without producing any appearance of fissure or fracture externally.

Wounds of the *brain* sometimes prove instantaneously mortal even when slight, while in other cases, recoveries will take place from contused or punctured wounds of this organ, contrary to all expectation.¹ When the individual survives the first effects of the injury, there are two sources of danger which await him: 1,—the production of fungus from the exposed portion of brain; and 2,—inflammation and its consequences. The process of inflammation, it must be remembered, is very slowly established in this organ: it may not manifest itself until from three to ten weeks after the receipt of the injury.

¹ The reader, who is desirous of knowing under what extraordinary circumstances recoveries have taken place where the brain has been seriously wounded, may refer to COOPER'S Surgical Dictionary, Art. "Head." Among the instances there quoted, is the following, recorded by Mr. Hennen. A French soldier, at the battle of Waterloo, was wounded by a musket-ball, which entered at the anterior portion of the squamous suture, and lodged in the substance of the brain. On the fifth day, after an enlargement of the wound and the removal of several fragments of bone, the ball was extracted from the posterior lobe of the right hemisphere of the brain, where it was found, resting on the tentorium. Yet, during the several previous days, the man, with the exception of a slight head-ache, and partial deafness of the right ear, seemed to enjoy perfect health. The case ended well.

In concluding the subject of wounds of the head, I shall notice two medico-legal questions which are liable to be raised respecting them.

I. Is it possible for a person, after having received, and while labouring under a severe injury to the head, to perform acts of volition and locomotion ? The answer to such a question would depend, in some degree, on the extent of the injury; but we have had occasion to witness, in the details of many of the cases quoted, facts that warrant our giving an affirmative answer where the circumstances under which the dead body of a wounded person is found, are not directly opposed to such an admission. In a case of a severe blow or fall on the head, without fracture, the concussion produced may be only momentary, and the individual will have it in his power to move from the spot and execute many acts, although he may be found dead very soon afterwards. When fracture is a consequence of the accident, and besides this, there is a considerable depression of bone, it is also possible that a person may perform acts of volition; although, according to the experience of some of our highest surgical authorities, it is chiefly in those cases of fracture with depression, where a portion of brain has been lost, that we should expect this power to be preserved. Nevertheless, the experience derived from army practice, has fully proved, that the extent to which the bones of the skull are depressed, can afford no criterion of the degree of disturbance in the cerebral functions: for it has been often remarked, that the violence of the symptoms was in an inverse ratio to the extent of depression. "Various instances," says Thompson, in his 'Observations made in the military hospitals of Belgium,' "presented themselves, in which, though a considerable degree of compression must have been occasioned, sometimes by the depression of both tables, and at other times by the depression of the inner table only of the skull, yet neither stupor, paralysis nor loss of memory, was produced. In one of these cases, the middle of the right parietal bone was fractured and considerably depressed by a ball, which was

extracted on the twentieth day. In this case, neither stupor nor paralysis appeared. In another, a musket-ball had struck the right parietal bone, fractured it, and was flattened and lodged between the tables of the skull. The inner table was much depressed, yet no bad symptoms supervened.'” Thus then, although compression of the brain, from whatever cause, commonly destroys the powers of volition and locomotion by producing coma if extensive, or paralysis if slight; yet the medical jurist will perceive, that compression may exist to a very great extent, and the brain be seriously injured, without its functions becoming necessarily destroyed.

II. *Is it possible that death may be caused by an injury to the head, without leaving any observable morbid change?* I have been induced to give this a place among the medico-legal questions, relative to injuries of the head, from the report of the following case, which occurred at Montpellier, in the year 1833.²

On the 12th of May, 1833, the sieur Charles Crès received a slight blow on the head. He felt himself merely indisposed for the two following days; but soon afterwards he became seriously ill, and he died on the 20th of the month, eight days after the infliction of the violence. His medical attendants declared that his death was owing to the blow.

Their report of the condition of the deceased, during life, was as follows. When first called to see him, they found a slight contused wound of the scalp, from which blood had flowed. This wound was situated at the upper and posterior third of the right parietal bone, where it is joined to the occipital. The scalp around was very puffy. On the 14th of May, the deceased suffered from severe cephalalgia; and the following day he experienced slight convulsive fits, which, in the opinion of the attendants, proved the existence of concussion of the brain, with cerebral excitement and congestion. In spite of the application of proper

¹ COOPER'S Surg. Dict. Art. Head.

² Annales d'Hygiène. Tome XI. p. 474.

remedies to subdue these symptoms, arachnitis with other signs of internal mischief supervened, together with gastroenteritis. The cerebral disease continued to increase, until the symptoms indicated a disorganization and compression of the brain which resisted the usual remedial agents. The examiners concluded by attributing the disease which proved fatal, to the immediate effect of a blow on the head, received by the deceased. This opinion, which seriously affected the party who inflicted the blow, had, it appears, been pronounced without reference to the post-mortem examination of the body, and it was considered as a great deal more positive than the facts absolutely warranted.

The body was inspected by three other medical men, in the presence of those who had attended the deceased. It was not quite cold, and cadaverous rigidity had just commenced. The skin, in some parts, was covered by cadaverous ecchymoses; and, on the left side of the chest, there were the marks of blisters, which had been recently applied. The scalp presented, at the part where the blow was alleged to have been inflicted, a cicatrix of recent origin, and of about a quarter of an inch in diameter. It was of a superficial nature, scarcely perceptible externally, and did not extend through the thickness of the scalp; for on reflecting this, there was no trace of it visible on the inner surface. There was no hardening of the scalp around, nor was there any appearance of extravasation of blood beneath. But about two inches below the cicatrix, and totally unconnected with it, was an ecchymosis covering half an inch of the scalp. The cranium was then opened, and the skull closely examined over the whole of its internal and external surfaces, but there was no appearance of fracture or other injury,—neither was there any fracture at the base. The membranes of the brain were perfectly natural and healthy, as well as the substance of the brain itself. Neither the tunica arachnoides, nor the pia mater, presented the least trace of inflammation: the vessels in the convolutions of the hemispheres were somewhat congested. The ventricles

contained a small quantity of a yellow serous liquid, but insufficient to cause any apparent distension of the parietes of these cavities. The rest of the brain, as well as the spinal marrow, was perfectly healthy.

On opening the chest, there were strong adhesions of the right lung to the parietes. The upper lobes of both lungs were healthy and crepitating; but the lower and posterior portions of the organs were of a brown colour, and so consolidated as not to be in the least crepitating: at the same time they were easily lacerated by the pressure of the finger. On cutting into these portions a dark-coloured blood escaped.

In the abdomen, the liver, spleen and intestines appeared perfectly healthy, and free from inflammation. On making a section of the liver, a small quantity of sero-sanguinolent liquid escaped. The stomach was collapsed: it contained a small quantity of dark-coloured liquid, and there was a patch of redness on the mucous membrane, about two inches in extent, near the œsophageal opening. The kidneys presented slight and unimportant morbid changes.

The conclusions of those who conducted this examination, were—

I. That the deceased had not died either of inflammation of the brain or its membranes, of fracture or extravasation, or of any other *appreciable disorder* in that organ or its appendages.

II. The only important morbid changes in the body, which would account for death, were those witnessed in the lungs; and, so far as the anatomical inspection could indicate the cause of death, it should be referred to disease of those organs.

This qualification of their opinion, as to the cause of death, was made, because, as they observed, an opinion, founded on the post-mortem examination, could not be complete unless taken with the history of the symptoms during life; and as they were not in possession of this, they did not feel themselves justified in giving a more decided answer.

We cannot but admire the caution displayed by these

examiners, compared with the hasty decision of the medical attendants of the deceased, who absolutely asserted in their report, that death had taken place from arachnitis and extravasation, as a direct consequence of the blow, *before the body had been inspected.*¹

The case was of so much importance, that the Faculty of Montpellier were called upon to decide between the opposite conclusions of the two reports. The Faculty, after due deliberation, returned the following answer to the question which had been proposed to them:—"To what cause can the death of the deceased, Charles Crès, be attributed?"

1. Death cannot be attributed either to concussion, compression, or inflammation of the brain or its membranes.

2. There is every reason to believe that péripneumonia, combined with an adynamic fever, destroyed life.

3. Consequently, the blow received on the head, cannot be regarded as the real cause of the disease which proved fatal: it may have operated as an accidental cause, like any other physical or moral shock to the system, in an individual already predisposed to inflammation of the pulmonary organs.

The Faculty, considering it necessary to assign reasons for their decision, attached to their report the following additional observations.

1. *Concussion*, or that state of stupor and insensibility, produced by a violent shock to the brain, is sometimes sufficient to destroy life, without producing any morbid alterations in the organ affected. From this admission it might be inferred, that the deceased had died from such a species of concussion. But it is necessary to remark, that the effects of concussion are immediate. If it destroy life, it is instantaneously, or within a few hours, and rarely so long as one or two days after the application of the violence: in those cases, in which the insensibility and coma are thus protracted, the symptoms continue to increase in intensity, without any perceptible interruption, from the moment of

¹ At least this is what I gather from the report published. It appears that they were not intrusted by the "Juge d'instruction" with the responsibility of making the inspection.

the accident until the period at which it proves fatal. Now it results from the depositions of the witnesses, that M. Crès did not experience any symptoms of this description, or only to a very slight degree, and for an inappreciable period of time; since he immediately endeavoured to defend himself against those who assaulted him, and this with great presence of mind and deliberation.

There is no ground for believing that *compression* was the cause of death. Neither the symptoms during life, nor the appearances after death, shewed that the brain had been subjected to compression, either from depression of bone, internal extravasation of blood, or formation of matter. The serous fluid, found in the ventricles, was the same in quantity and quality as that found in almost all subjects, whatever may have been the cause of death.

Inflammation of the brain or its membranes, which is sometimes a consequence of a violent blow on the head, did not exist in this case; at least there were no appearances whatever of its having affected any of the contents of the cranium. The serous liquid of the ventricles had not the characters of a product of inflammation, and the fulness of the vessels on the surface of the hemispheres, merely indicated sanguineous congestion. But it might have been here a question, whether the pathological characters of inflammation might not have existed, and have been destroyed by death. In answer to this, the examiners alleged, that when inflammation was sufficiently severe to destroy life, and had continued for four or five days previous to that event, such an effect could not follow. The appearances of inflammation are only destroyed by death, when extremely slight and of very recent occurrence.

II. That the medical attendants of the deceased had observed some symptoms of morbid changes in the pulmonary organs, is proved by the fact of blisters having been applied to the chest. That the symptoms of pulmonary disease were not so striking, as specially to call their attention, is to be explained by supposing that the peripneumonia was of that insidious character which it is often known to assume, when conjoined with typhoid or malig-

nant febrile affections. The cephalalgia and convulsive motions observed by the attendants, are referable to this cause.

III. That the deceased had already suffered from inflammation of the lungs, and that he was predisposed to pulmonary disease, are facts proved by the report of the post-mortem examination. Thus situated,—having been exposed to ill-treatment, and violently excited by passion, and probably also, as was proved by one witness, by the use of spirituous liquors, it is not surprising that a sudden aggravation of the disease should have destroyed life.

It follows, from these considerations, that the ill-usage to which the deceased was subjected was not a direct cause of death; and, in asserting this, the authors of the first report were misled by symptoms which a pathological examination shewed to be more probably dependant upon another cause. The most that can be said of the injury, is, that it may have operated incidentally in rendering the disease fatal.¹

There are many points of interest in this case: it shows that in death after an injury to the head, we must not be too ready to look upon this as the cause, or pronounce an opinion until a most complete examination of the body has been made. In the above instance, had not the Faculty of Montpellier demonstrated that the authors of the first report pronounced too positively that the deceased had died from violence, the aggressor must have been condemned to death. As it was, a slight sentence was passed upon him.

In the reasons assigned by the Faculty for their decision, we find comprehended those rules by which a careful medical jurist should be guided in these investigations. They admit that there are cases in which concussion may destroy life, without leaving any morbid changes in the contents of the cranium; but while they cautiously admit this, as a general principle, they deny its application to

¹ This report bears the signatures of five members of the Faculty, and among the names is that of PROFESSOR LALLEMANT.

the particular instance in which their opinion was demanded. The grounds upon which this denial was made, are stated with sufficient clearness; and, in my opinion, they are perfectly satisfactory. But it will be seen that the witnesses took into consideration the situation of the deceased during life, which a medical jurist might not always be enabled to do. Had the deceased been found dead with the mark of violence on the head, and nothing was known but that he had been struck, the point could only have been decided presumptively; for the fatality of an injury to the brain, does not always bear a direct ratio to the external marks of violence met with on the scalp. Even the co-existence of disease would not have effectually removed all doubt, unless it were of a nature to destroy life suddenly; and the post-mortem changes in the lungs would have assisted very little in the satisfactory decision of this case, had there been no evidence to show the consequences of the blow during life.

In answer to the medico-legal question proposed, it may then be admitted that life can be destroyed by concussion, and no morbid appearance or change of structure will be met with on dissection. Before, however, a medical opinion to this effect is given on a dead body, whose history is but imperfectly known, it will be proper to search every cavity and inspect every organ, so that we may satisfy ourselves that no natural causes exist to account for death. Then, if the general evidence establish, that a blow on the head has probably destroyed life, a medical jurist is justified in making a cautious admission that such an injury might prove fatal, although there were no observable morbid alterations, and although the marks of external violence were slight.

CHAPTER IX.

WOUNDS.

Wounds of the face,—penetrating wounds of the orbit,—gun-shot wounds of the mouth,—wounds of the neck,—punctured wounds of the carotid arteries and jugular veins,—of the cervical nerves.—Incised wounds of the neck,—of the trachea,—œsophagus,—arteries and veins,—possibility of performing acts of locomotion after such wounds,—evidence in the case of Danks.—Wounds of the thorax,—of the lungs,—how rendered fatal.—Wounds of the heart—not immediately fatal,—which cavities most commonly wounded,—volition and locomotion after severe wounds,—wounds and ruptures of the diaphragm,—question of survivorship after such wounds. Wounds of the abdomen,—contusions,—ruptures of the viscera,—penetrating wounds of the stomach and other organs. Legal relations of wounds,—provisions of the Lansdowne statute,—of the ancient law.—Legal definition of a wound,—defects of the Ellenborough act,—can a wound within the statute be produced without a weapon?—Opinions of the judges. Does oil of vitriol produce a wound?—defects of the Lansdowne statute. Penal code of France.—Mayhem or maiming,—What constitutes maiming in a medical and legal point of view.—inconsistent applications of the law.—Remarks upon the legislation of the French regarding wounds.

Wounds of the Face. Wounds of the face are important on several accounts. When of any extent, they are usually followed by great deformity; and when penetrating the cavities in which the organs of the senses are situated, they often prove fatal by involving the brain and its membranes, or by giving rise to inflammation in that organ.

Wounds of the Eye-brows. These are not always of so simple a nature, as might at first sight be supposed. Besides being attended by deformity when they heal, they are liable to give rise, during the process of healing, to serious disorders of the neighbouring parts. Amaurosis and neuralgia are

recorded among the secondary and not unusual consequences of such wounds, where the supraorbital nerve has become at all implicated. Under certain conditions of the system, there may be inflammation of the parts within the orbit, extending by contiguity to the membranes of the brain, and proving fatal by leading to the formation of matter within that organ. In a work recently published, an instance is recorded of the occurrence of amaurosis in the right eye, after a contused wound, not of a very violent nature, to the right eye-brow.¹

Wounds of the Eyelids.—A wound confined to the eyelids, is commonly free from danger; the most serious mischief that follows, if the wound be extensive, is greater or less deformity. When the tarsus is divided perpendicularly, ectropion and epiphora may be the consequences:—if the lids be wounded near the inner angle of the eye, then fistula lachrymalis may follow. A wound of the eyelid may, however, prove fatal through the extension of inflammation by the contiguity of parts. A case of this description, which it will be well for the medical jurist to bear in mind, when forming his prognosis of these injuries, has been recorded by Petit of Namur, and is to be found in the works of Orfila² and Devergie.³

An officer received a sword-wound in the lower eyelid, on the right side, close to its junction with the cheek; the external wound was so slight, that it was healed in four days. But on the second day after the accident, unfavourable symptoms manifested themselves; the patient suffered from violent cephalalgia, and from slight pain in the left arm, combined with a difficulty of moving the extremity. The arm became gradually paralysed, and the left thigh began to present symptoms of paralysis, when the patient died, about three months after the injury. The intellectual faculties remained clear until the last, and the vision of both eyes was undisturbed. On an inspection of the body, nothing remarkable was observed about the wound; it was quite superficial and had perfectly healed: but in the

¹ DEVERGIE. Méd. Lég. Vol. II. p. 220. ² Méd. Lég. Vol. II. p. 454.

³ Méd. Lég. Vol. II. p. 222.

anterior and inferior part of the right hemisphere of the brain, was a considerable abscess, containing a large quantity of pus. The discovery of this abscess satisfactorily accounted for death; its formation could only be ascribed to the extension of inflammation from the slight wound of the eyelid.

Contused wounds of the eyelids are generally attended with considerable injury to the organs of vision, and may terminate fatally by producing inflammation of the brain.

Wounds apparently confined to the external parts, frequently conceal deep-seated mischief. A sharp instrument penetrating the eyelid, and passing upwards with any force, will produce fracture of the orbital plate of the frontal bone, which is known to be extremely thin, and even injure the brain beyond. Sir Astley Cooper relates, that a girl, while playing with a pair of scissors, accidentally fell, and the point of the scissors passed upwards under the upper eyelid. It was found difficult to extract them; the eye became inflamed, but for some days after the accident, the child was in the habit of walking a considerable distance daily to receive medical advice. In about ten days, she suffered violent pain, with symptoms of inflammation of the brain, under which she died. On inspecting the body, it was found that the orbital process of the frontal bone, had been fractured, the dura mater torn, and the anterior lobe of the brain lacerated. In several instances in this country, trials for murder have taken place, in which death has been caused by a penetrating wound of the orbit fracturing the orbital plate and injuring the brain. In the year 1735, the celebrated Macklin, the comedian, was tried for having caused the death of Thomas Hallam, by thrusting a stick into his eye. On inspecting the body of the deceased, it was ascertained that the stick had entered the brain; the prisoner was found guilty of manslaughter. It is necessary for the witness to bear in mind, that such an injury may be produced by the application, comparatively speaking, of only a moderate degree of force.

Wounds of the Eye.—These wounds, whether penetrating or contused, are almost always attended with a destruction

of the power of vision. This may proceed, either from an instantaneous evacuation of the humours at the time of the injury, or it may be a slow result of inflammation. A simple wound of the cornea, if in the centre of that membrane, is usually followed by opacity in healing,—a change which may effectually destroy the sight of the eye. These injuries may also prove fatal by an extension of the inflammatory process to the brain; and where this is not a result, various diseases of the eye may be produced, which are commonly accompanied by great deformity.

Wounds of the Nose.—These are, generally speaking, of a simple nature, rarely giving rise to serious symptoms, but they are almost always attended with great deformity. If the injury be contused and, at the same time, extensive, a loss of the faculty of smelling will probably result. A penetrating wound of the nose, produced by passing a sharp-pointed instrument up the nostril, may destroy life by perforating the cribriform plate of the ethmoid bone and injuring the brain. Such a wound, it is obvious, might be produced without leaving any external marks of injury.

Wounds exposing the antrum maxillare, are sometimes followed by fistula or caries, if the bone be much injured. A supervention of either of these diseases, retards the healing process; but the symptoms are rarely such as to give rise to much anxiety on the part of the medical attendant. Similar remarks may be made relative to wounds of the frontal sinuses. The fistulæ which result, are the most unpleasant consequences; but the symptoms are never alarming, unless there be co-existing injury to the brain. The matter which is discharged during the healing of a wound of the frontal sinuses, has been mistaken for altered cerebral substance; and the wound has been pronounced mortal, because the medical attendant had supposed from its appearance that the brain was implicated.¹

Wounds of the Ear.—Wounds of the external ear are but of little importance in their consequences. Some authors have described the inflammation set up during their healing,

¹ ORFILA. Vol. II. p. 459.

as being occasionally followed by gangrene, from the languid state of circulation in the organ. Wounds penetrating the tympanum through the meatus externus, are almost always followed by a loss of hearing; but such wounds, if severe, may be attended with inflammation and suppuration: and from the vicinity of the brain, this organ will sometimes participate in the secondary consequences, so that life may, in this manner, be destroyed. Contused wounds of the mastoid process may give rise to suppurative inflammation, or caries of the bone. Although the external ear, from its lateral position, is less prominent than the organs of the other senses, yet the loss of it or of a part of it, would perhaps be considered a "disfigurement" within the meaning of the statute 9 Geo. IV. c. 31.

Wounds of the Lips and Cheeks.—These, from the abundant supply of arteries to the face, are often, in the first instance, accompanied by a considerable effusion of blood; the hæmorrhage, however, is very easily arrested by pressure. If of any extent, they can never heal without leaving more or less deformity. Should the wound of the cheek involve the parotid gland or its duct, salivary fistula may be the consequence.

Wounds of the *tongue* are not attended with much danger; even a considerable portion of the organ may be removed with no other evil after-consequence than that of the loss of speech. A large portion of the tongue may be lost without effectually destroying the sense of taste; and it has been frequently observed, that after a longer or shorter period, an individual has recovered the power of articulating to a certain extent, although several years are commonly required for this to take place.¹

Wounds of the *mouth*, when inflicted by fire-arms, are in general instantly mortal, in consequence of the free hæmorrhage by which they are attended. If the individual should survive several days, he is not to be considered safe; for a fatal hæmorrhage may supervene at the time that there is, to all appearance, every prospect of recovery. The

¹ DEVERGIE. Méd Lég. Vol. II. p. 230.

following case is recorded by Boyer. A man discharged a pistol into his mouth,—for nine days he went on favourably ; but on the tenth day he died, in consequence of the sudden effusion of a large quantity of blood. It was found on inspection, that the hæmorrhage had proceeded from the internal maxillary artery. The ball had bruised and disorganized this vessel, where it passed near the zygomatic process ; but it was not until the slough which followed, had come away, that the death of the individual was caused by the quantity of blood lost.

Wounds of the Neck.—These wounds occupy an important place in legal medicine, since it is this part of the body which is commonly selected by the suicide to carry out his fatal intention ; and also by the murderer, when he wishes to make it appear that his victim has destroyed himself. Taking the anterior part of the neck, those wounds which occupy the median line, are less dangerous than those which extend laterally, since the more important vessels are here situated. Punctured wounds of the neck are not, *cæteris paribus*, so dangerous as those which are incised, provided timely assistance be rendered. An incised wound, involving the trunk of the carotid, is regarded as necessarily fatal ; but there are several instances on record of recovery from punctured wounds of this vessel ;¹ and, even where the wound has proved fatal, death has not always been immediate. Much, however, will depend upon the extent to which the artery has been penetrated, and the assistance which is at hand to restrain the flow of blood by pressure. M. Delpech² succeeded in curing a wound of the right common carotid, which had been produced by the point of a two-edged sword. The weapon had penetrated immediately above the sterno-clavicular articulation on the right side, and had passed in a direction from above downwards. Pressure was immediately employed by those who were present ; the man remained in the hospital at Montpellier, eleven weeks, and left it perfectly cured. A punctured wound of the internal carotid is generally followed by speedy

¹ DEVERGIE. Méd. Lég. Vol. II. p. 230. ² Revue Méd. Déc. 1824.

death, since the situation of the vessel is such that pressure could be but imperfectly applied to it, even if an individual survived sufficiently long to allow the attempt to be made. For the same reason, a punctured wound of one of the vertebral arteries might equally determine death. A punctured wound of the external jugular vein is but of trivial importance; but one which involves the internal jugular vein is highly dangerous, though not necessarily mortal, if timely pressure be applied. The vein would require to be secured by ligatures, an operation which is liable to be followed by phlebitis or subcutaneous cellular inflammation; and the life of the wounded person may be cut off through the intervention of either, or both of these secondary causes. In such a case, unless there be other extenuating circumstances, the aggressor ought undoubtedly to be held responsible for the fatal consequences. The operation required was necessary to prevent the death of the wounded party;—in the opinion of the medical witness it might have been the only chance of saving life; and therefore the ends of justice would be but imperfectly fulfilled by the acquittal of a man, on the ground that his victim had died from an operation, when this afforded the only means of preserving him. M. Devergie has recorded a case in which a man was stabbed in the neck; the jugular vein was so seriously wounded, that two ligatures were required to restrain the flow of blood: inflammation of the cellular membrane followed, but the wounded party died on the eighth day from secondary hæmorrhage.¹

Punctured wounds of the nerves of the neck are dangerous, but it is rare that the wound is confined to them alone. A punctured wound, involving any of the nerves of the cervical *plexus* would give rise to paralysis, and might prove fatal by leading to tetanus.

Punctured wounds of the trachea are not commonly of an alarming nature; they are attended by a loss of voice, although, according to Devergie, this is not uniformly the case. I have seen, however, perfect aphonia follow from a

¹ Op. Cit. Vol. II. p. 232.

slight puncture of the trachea. It was in the case of a female who, from a religious delusion, attempted to commit suicide by stabbing herself in the throat with a carving-knife. There was but little hæmorrhage, and the woman, after a short time, completely recovered. A well-known consequence of a wound of this organ, is emphysema, which, however, rarely leads to dangerous after-effects ; although, when the external orifice is hastily closed, and the internal, left open, it may extend to such a degree, as seriously to impede respiration. The medical jurist should remember, that a wound of this organ may prove fatal, even where there has been but a very slight loss of blood, by the effused liquid becoming introduced into the trachea and obstructing the air passages.

Punctured wounds at the back of the neck, are not commonly attended by such serious results, as those inflicted on the fore part. It may happen, however, if the instrument be sharply pointed and capable of cutting, that it will penetrate between two of the vertebræ, and destroy life by wounding the spinal marrow. Such an instrument used with violence, is very liable to enter between the first and second cervical vertebræ, and under these circumstances death would be instantaneous. A wound of the spinal marrow at the lower part of the neck, might not prove instantly mortal ; because in this case, although all the parts below the wound are paralysed, respiration is continued by means of the phrenic nerves.

Incised wounds of the neck are more frequent, and at the same time more dangerous than those which are punctured. These wounds are commonly seen anteriorly, and they may be situated either above or below the os hyoides. A deeply incised wound between the lower jaw and the os hyoides, is usually fatal from the number of arteries which must be divided by the instrument. If prompt assistance be rendered, however, the life of a wounded party may be saved. Dr. Horner, of the University of Pennsylvania, succeeded in saving a criminal who thus attempted suicide. The man, after hearing his sentence, plunged a knife in his throat, a little below the angle of the lower jaw, on the right

side. Before the weapon could be taken from him, he withdrew it and plunged it again into the same spot. The hæmorrhage, which was copious, had an arterial character, so that the Doctor considered, either that one of the carotids or some of their larger branches, must have been divided. Pressure was immediately applied to restrain the flow of blood, and as soon as instruments could be procured, the primitive carotid was cut down upon and tied. In less than a month the patient was well.¹

In wounds below the os hyoides, the large venous and arterial trunks may escape by the prominence of the larynx and trachea, unless the incision be extended very far laterally. Incised wounds affecting the trachea, may prove mortal by the hæmorrhage causing suffocation; since it is not always easy to prevent the blood from flowing into the air passages. A hasty closure of the wound will thus, sometimes, accelerate death. The following case occurred a few years since in London. A man inflicted a transverse wound on his throat; it was about four inches in length, and passed across the middle of the thyroid cartilage. There was no considerable hæmorrhage, and the carotid arteries had escaped being wounded. The external orifice had, in the first instance, been closed, and the patient was almost suffocated, partly by the occurrence of emphysema, and partly by the blood flowing into the trachea. On opening the wound, the patient's breathing was relieved, and a quantity of mucus mixed with blood was thrown out from the trachea at each expiration. After waiting some time, the pieces of divided cartilage were brought together by sutures, and the wound carefully closed. In a very short time the breathing became difficult, the countenance livid, and the man died apparently suffocated.

A complete division of the trachea is not necessarily fatal, although, from the retraction of the divided portions within the cellular membrane, the patient is very likely to die suffocated unless timely assistance be afforded. A complete division of the œsophagus is rarely seen unaccompanied by a fatal wound of the large arterial or venous trunks lying

¹ Medical Gazette. Vol. XI. p. 802.

by its side. Should the œsophagus alone be divided, the patient may die from inanition.

The most serious incised wounds of the neck, are undoubtedly those which involve the internal jugular veins and carotid arteries. Such wounds are often inflicted by suicides; and cases of self-destruction have been already related in which these large vascular trunks were completely divided on both sides of the neck; although commonly the division is complete on one side, and only partial on the other. A very important question here presents itself for the consideration of a medical jurist. Do such wounds of the carotid arteries and jugular veins prove so rapidly mortal, as to render it impossible for a wounded party to move from the spot, or perform other acts of volition? Not only may a doubtful case of murder rest upon the solution of this question, but, as an indictment specifies the locality in which a murder has been perpetrated, the acquittal or condemnation of a murderer might perhaps be determined by the answer of a medical witness. Many surgeons would probably assert, that after a division of the trunk of the common carotid, the branches of the external carotid, and the internal jugular vein, an individual could not possibly survive sufficiently long to perform the least act of volition; but the following case, recorded by Mr. Amos, an experienced and intelligent barrister, will shew that great caution ought to be used in the expression of so positive an opinion, in cases where such severe injuries are proved to have been received.

John Danks was tried for the murder of Mary Green.¹ The prisoner was a farmer's labourer, and occasionally cohabited with the deceased, who was then far advanced in pregnancy with a child, which she had some time before sworn to him. It appears, that on the evening on which the murder was committed, the 18th of February, 1832, the prisoner left his home and was traced to the house of the deceased. They were then seen to proceed together to a place called Astley's Hovel, which was situated by the side

¹ Warwick Spring Circ. 1832. Vide Medical Gazette. Vol. X. p. 183.

of a road, but at some distance from any habitation. Shortly after they had gone, cries of distress were heard, which appeared to come from this spot. Between eight and nine o'clock the next morning, the body of the deceased was brought home, having been found lying in the road, at a distance of *twenty-three yards* from Astley's Hovel.

Immediately upon the alarm being given, the hovel was examined, and from the quantity of blood, it was evident that some one had been severely wounded there. The blood was traced from this place to a gate, some yards from it on the road-side, and over that gate to the spot where the deceased lay. The prisoner was speedily apprehended, and on his clothes were found some marks of blood; a button with blood on it had been picked up at the gate already mentioned, and this button, on comparison, corresponded exactly with those of the prisoner's waistcoat. The knife with which the murder had been committed, was found in an adjoining wheat-field, and was identified as belonging to the prisoner. At first the man attempted to exculpate himself by a weak *alibi*, and endeavoured to account for the blood on his clothes by saying, that he had assisted in killing a pig:—this statement, however, was subsequently proved to be false. On his being committed to gaol after the inquest, he made the following confession to a constable. He said, that he and the deceased had walked together to the hovel, and were there for about a quarter of an hour, when he knocked her down by striking her on the temple. He fell on her back, and held her under him: he cut her throat, but this did not prevent her crying; he cut her again, and then she ceased crying, so that he thought she was dead. He then left the place, got over the gate, and went up the road. When about one hundred yards from the hovel, he thought he heard the footsteps of a man coming after him, but upon turning round he saw nobody. He shut the knife, threw it into the wheat-field and made his way home.

The evidence respecting the condition in which the body was found, was as follows. The constable deposed, that when he came to the spot, he perceived the deceased lying

on her face with one arm under her ; it was impossible for any one, as the body lay, to see that the throat was cut. The deceased's cap was off her head, and part of it stuck to the blood on her face. There was a large quantity of blood on the straw in the hovel :—there were marks of blood on the wood-work at the side of the hovel, and also from this to the gate. On the bars of the gate, there was a quantity of blood ; and on the topmost bar were marks, as though it had been pressed by a heavy hand.

The evidence of a surgeon who was called to see the body, was to the effect, that he found at the upper part of the throat, near the left angle of the jaw, a gaping incised wound, about seven inches in length and three in depth. It extended posteriorly to the commencement of the œsophagus, and passed obliquely down the right side of the neck as far as the fourth cervical vertebra. *The trunk of the carotid artery and all the principal branches of the external carotid, with the jugulars, were divided ;* and, in his opinion, such a wound must have occasioned death *immediately, or within a very short time*,—so short, as to render it highly improbable, but not impossible, that the woman could have gone the distance of twenty-three yards, besides getting over the gate, in that dreadful condition. There was another incised wound, two inches below the former, in front of the throat, but not deep enough to divide the trachea ;—with *that* wound alone, the witness admitted, the deceased might have been able to reach her home. The evidence of this gentleman, as to the nature of the wounds and the almost utter impossibility of the larger one having been inflicted in the hovel, was given before the prisoner's voluntary confession.

Danks was found guilty of the murder and executed. Of his guilt, observes Mr. Amos, no reasonable doubt can be entertained, but still the circumstances of the case are of a singular nature in a medico-legal point of view. Did the murderer really inflict the mortal wound in the hovel, or on the spot where the body was found ? If the former, is it not an extraordinary fact, that after such a wound, the power of locomotion should have remained to so large an extent ? The opinion of the surgeon, continues Mr. Amos, was

obviously such as the majority of intelligent medical witnesses would have given, and such only as they would, most probably, have felt themselves justified in giving. All the facts of the case, however, being put together and duly weighed, we can come to no other conclusion, than that the murderer's declaration was perfectly true,—that both the wounds were inflicted in the hovel, and that the miserable woman was afterwards able to get on her feet, to proceed to the gate and over the gate, to the place where she fell from utter exhaustion.

The following additional particulars have been added by the solicitor for the prosecution. The wound first inflicted by the prisoner was quite inconsiderable ; it was situated at the lower part of the neck, within an inch of the clavicle, and was very superficial : the integuments were merely cut through, and the cartilage of the trachea was scarcely grazed. From such a wound, *the quantity of blood in the hovel could not possibly have flowed*. On the other hand, there would have been from the second and more severe wound, a most copious flow of blood, which must have been thrown off by the prominence of the deceased's abdomen to the side of the hovel, as she passed along to the gate : then on the gate a similar transfer of blood was manifest, and there were the *marks in blood of both her hands*. The prisoner's hand was also marked on the gate, but at a different place. From several trials, it was determined that it took from fifteen to twenty seconds to pass from the hovel, where the wound was alleged to have been inflicted, to the spot where the body was found. The obstruction of the gate, which was three feet ten inches in height, was considered to be equivalent to eight or ten yards more. There was scarcely any blood between the gate and the place where the body lay ; but this was accounted for on the probable supposition, that in running, the deceased had closed the wound with her cap,—at the same time, perhaps, assisting this closure by holding down her head. A large quantity of blood had flowed down the fore part of her body, and had lodged about the lower part of the abdomen. A great deal had also been absorbed by the under garments. But, in estimating the time that

elapsed from the infliction of the wound, till the unfortunate woman dropped, supposing it to have been inflicted in the hovel, there are other circumstances which require to be taken into consideration. We cannot conceive that the deceased rose to run away on the instant she received the wound,—she may have lain several seconds, at least until the prisoner himself had left the hovel, and several more may have passed before she could have risen from the ground. Lastly, it may be added, that the prisoner declared, to the hour of his execution, that he never touched the woman except in the hovel where he left her for dead.

Such then, are the particulars of this singular case. From a careful review of the facts, however contrary to ordinary experience the admission may appear, we are constrained to admit, that the deceased actually survived a sufficient length of time to run the distance described. We can only deny this by disbelieving the facts; for, independently of the prisoner's declaration, the quantity of blood found in the hovel was such that it could not have proceeded from the superficial wound at the lower part of the neck, but must have come from some considerable vessels. Now if, with the knowledge of this circumstance, it be supposed that the mortal wound was inflicted on the spot where the deceased's body lay, still the difficulty is rendered greater, because then the deceased must have run to the hovel to have bled, and back again. Nor can we imagine that her body was conveyed after death from the hovel to the place where it was found by the prisoner, since the marks of her hands on the gate shew that she must have been living at the time; besides there could be no possible motive for the prisoner carrying her either living or dead, twenty-three yards on the road. In short, no explanation will suit the circumstances, but that which allows that the deceased actually exerted her powers of volition and locomotion.

The following case of voluntary locomotion after a severe wound, was communicated to me by a friend. It will be seen that the distance traversed, was much less.

In October 1833, a man committed suicide while walking along Oxford Street, by cutting his throat with a razor.

After having inflicted the wound, he was observed to hold a handkerchief to his neck, and run forwards. He fell dead on the pavement, having run about four yards from the spot where he wounded himself. The razor was found firmly grasped in his hand. On an examination of the body, it was ascertained that the carotid artery and several of its branches, with the jugular vein on one side, as also the trachea, had been completely cut through. The surgeon gave it as his opinion, at the inquest, that from the character of the wound, the deceased must have fallen dead on the spot; and, although it was possible that he might have run so far as stated after the infliction of the wound, yet such a circumstance would be quite unusual.

The truth is, questions of this nature, like those relating to the mortality of wounds in general, are only to be decided by reference to a very enlarged sphere of experience. In treating of wounds of the brain, one or two cases were described of recoveries having taken place from injuries to that organ, which, if judged of by ordinary experience, would have been pronounced immediately mortal. A case like that of Danks, may be rare; but still it proves that we should be very guarded in denying that acts indicating volition and locomotion, have been performed by a deceased party, however severe the wound which has been the cause of death.

Wounds of the Thorax.—These have been divided into those which are confined to the parietes, and those which penetrate the cavity. The division is important, so far as relates to the prognosis of such injuries.

Incised or punctured wounds of the parietes of the chest, are rarely followed by dangerous consequences. The hæmorrhage is not very considerable and is generally arrested without much difficulty. These wounds heal either by adhesion or suppuration, and unless their effects be aggravated by incidental circumstances, the prognosis is very favourable.

Contusions or contused wounds of the thoracic parietes are, however, far more dangerous; and the danger is always in a ratio to the degree of violence used. Such injuries, when

severe, are ordinarily accompanied by fractures of the ribs or sternum,—by a rupture of the viscera within the cavity, including the diaphragm,—by profuse hæmorrhage,—or, as an after-effect, by inflammation of the organs, with or without suppuration. Fractures of the ribs are dangerous for several reasons :—the bones may be splintered and driven inwards, thereby wounding the lungs and causing hæmorrhage, or leading to inflammation of the pleura or lungs. In fractures of the upper ribs, the prognosis is less favourable than in those of the lower, because, commonly, a much greater degree of violence is required to produce the fracture. A simple fracture of the sternum, without displacement of the bone, is rarely attended with danger, unless the concussion has at the same time produced mischief internally, which will be known by the symptoms. When, however, the bone is depressed as well as fractured, the viscera behind may be mortally injured. In a case of depressed fracture of the sternum, recorded by M. Sanson, the individual died after the lapse of thirteen days; and on inspection, it was found that the fractured portion of bone had produced a transverse wound of the heart about an inch in length. The cavities of the organ had not been penetrated, but the piece of bone was exactly adapted to the depression produced by it on the parietes.¹ A witness will frequently be required to take into consideration the effects of contusions on the thorax, with or without fracture, in cases of death from pugilistic combats which of late years have given rise to so many trials for manslaughter.

Wounds penetrating into the cavity of the thorax, are generally dangerous even when slight, in consequence of the numerous circumstances with which they are liable to be complicated. In these wounds, the lungs are most commonly injured; but, according to the direction of the weapon, the heart, or the great vessels connected with it, as well as the œsophagus or thoracic duct, may share in the mischief.

Wounds of the Lungs.—The immediate cause of danger

¹ DEVERGIE. Méd. Lég. Vol. II. p. 243.

from these wounds, is the consequent hæmorrhage which is profuse, in proportion to the depth of the wound and the size of the vessels wounded. Should the weapon divide any of the trunks of the pulmonary veins, an individual may speedily sink. The degree of hæmorrhage cannot be judged of by the quantity of blood which escapes from the wound ; for it may go on internally, and collect within the cavity of the pleura, impeding the respiratory process. This is especially to be apprehended where the external orifice is small and oblique, and one of the intercostal arteries has been touched by the weapon. A wound of the lung is generally known, among other symptoms, by the frothiness and florid colour of the blood which issues from the orifice, as well as by the expectoration of blood.

The protrusion of a portion of lung, which is described by surgical writers, as being a somewhat unusual case, does not appear to add considerably to the danger of a wound. The protruded portion has been, in several instances, excised, and the patient has done well.¹

Among the circumstances consequent on a wound of the lungs, is the diffusion of air throughout the subcutaneous cellular tissue, a condition which is known under the name of emphysema. It is chiefly observed in those cases in which the wound is small and obliquely penetrating. This symptom has been considered to serve as a diagnostic mark of a wound of the lungs ; but it is important to bear in mind, that it sometimes exists, to a certain extent, in cases where the lungs have not been wounded. When the external orifice of a wound is large and direct, then, during the first inspirations made by the patient, the air freely enters into the cavity of the pleura, and is subsequently expelled in expiration ;—a portion of it may, during its expulsion, pass into the cellular tissue around the orifice and render the skin emphysematous, although the lungs may not have been implicated. This false emphysema, if it may be so termed, is not seen when the wound is small and oblique. The entrance of air into the cavity of the pleura,

¹ COOPER'S Surgical Dictionary. Art. Wounds.

was formerly supposed to aggravate the danger of wounds of the thorax ; but this really does not appear to be the case, unless both sides of the chest be wounded, or the air be retained in considerable quantity. Neither is emphysema, under common circumstances, a source of danger: when it has gone on to a great extent, it operates by causing difficulty of breathing and symptoms of suffocation; but by judicious treatment, these effects will speedily vanish.

A more serious result is the inflammation which commonly attends on such wounds, when life is protracted. The patient may be attacked by inflammation of the pleura or of the lungs, which, unless quickly and properly managed, may prove fatal. Suppuration is also liable to follow inflammation of the lungs, and life may be destroyed during the process. This consequence has been remarked in those cases where foreign bodies have lodged within the substance of the organs,—such as pieces of cloth, a broken portion of the weapon, or a bullet, if the wound has been produced by fire-arms. It is necessary to observe, however, that there are many instances on record of bullets remaining lodged within the lungs for years and even for life, without producing serious symptoms. In the museum of St. Thomas's Hospital, is a bullet which was extracted from the lung of a subject brought into the dissecting-room. It was completely surrounded by lymph, and was encysted within the substance of the organ: it had evidently been in this situation for a considerable period, probably for many years, and its presence in the lung did not appear to be at all connected with the death of the individual. Other cases are related, in which, after a certain lapse of time, bullets have been expectorated by those who have received gun-shot wounds of the chest. During the convalescence of an individual who has survived the first effects of a wound of the thorax, the surgeon should observe whether death, when it occurs, may not have been caused by any imprudence on the part of a patient, as by an abuse of regimen or other misconduct; for, as it has been already remarked, circumstances of this nature would be regarded as mitigatory on

the trial of an aggressor. Thus it is very properly recommended that, in all cases where a party is progressing to recovery, a relaxation of the antiphlogistic regimen should be made with great circumspection. Too much nourishment, too frequent talking or any exertion, are circumstances that may cause a renewal of the hæmorrhage and extravasation.¹ A case is related in which a soldier died instantly from internal hæmorrhage, brought on by throwing a bowl at some nine-pins, *two months* after he had been apparently cured of a wound of the lungs.

Wounds of the Heart. These are among the most fatal of penetrating wounds of the thorax. It was formerly considered that all wounds of this organ were necessarily and instantly mortal. Undoubtedly, when either of the cavities is laid open to the extent of a few lines by a cutting or perforating instrument, the hæmorrhage is so profuse on the withdrawal of the weapon, that death must be almost immediate. But where the wound is small and penetrates into the cavities of the organ obliquely, then it is seen that life may be prolonged for a considerable period; and cases are on record in which it is probable that such wounds would have healed, and the patients have finally recovered, but for the supervention of other diseases which destroyed life.

The late Baron Dupuytren mentions the case of a man who received a stab on the left side of the chest, on November 5th, 1831. He was brought to the Hôtel Dieu, but the symptoms under which he laboured did not lead to the suspicion that he had received a wound of the heart. The man died on the 13th, of cerebral disease. On inspection of his body, it was found that the left ventricle was wounded about the middle and a little to the right; its cavity having been penetrated in a transverse direction. The wound was three lines and a half across, and one line from above downwards. The external fibres of the organ were most separated, the opening diminishing gradually, so that the internal fibres were in contact and closed the

¹ COOPER'S Surgical Dict. Art. Wounds.

wound. In another case recorded by the Baron, five or six wounds were made by means of a saddler's needle,—most of them penetrating into the right ventricle of the organ. This man died of cerebral disease, *twenty-five days* after the wounds could have possibly been inflicted; for the needle was taken from him twenty-five days before his death, without any suspicion being entertained of his having wounded himself with it. The external cicatrix was visible on an inspection of the body. The quantity of blood found in the chest amounted to about three ounces, and this appeared to have proceeded from the substance of the heart.¹ Other cases are mentioned in illustration of the position that wounds of the heart are not instantaneously mortal; but, in the opinion of the Baron, they also shew that these injuries are not necessarily fatal. There are few, probably, who will be inclined to go so far as this: a remote possibility of such wounds healing, and of the patient recovering, may be admitted; but until some clear instances of recovery from penetrating wounds of the cavities are reported, the majority of practitioners will continue to look upon them as necessarily, although not immediately, fatal. From a series of cases, collected by M.M. Ollivier and Sanson, it appears, that out of twenty-nine instances of penetrating wounds of the cavities of the heart, only two proved fatal within forty-eight hours. In the others, death took place at the varying periods of from four to twenty-eight days after the receipt of the wound.² These differences in the time at which death occurs, as well as the reason why wounds of the heart do not instantly destroy life, have been ascribed to the peculiar disposition of the muscular fibres of the organ, and to the manner in which they are penetrated by a weapon. Thus, as a general principle, it is stated that wounds which are parallel to the axis of the heart, are, *cæteris paribus*, less rapidly fatal, than those which are transverse to its axis. In a wound which divides the fibres transversely, the opening will be larger, and the hæmorrhage greater, than in one which

¹ Med. Gazette. Vol. XIII. p. 662, et seq.

² DEVERGIE, Méd. Lég. Vol. II. p. 246.

is parallel to these fibres ; and as the heart is composed of different layers, of which the fibres pass in different directions, so in a penetrating wound of its cavities, while one set tends to separate the edges, another tends to bring them together and to restrain the flow of blood. It is this action of the fibres, which renders wounds of the ventricles less rapidly fatal than those of the auricles, all other circumstances being equal. The presence of a weapon in the wound, also retards the fatal result, by mechanically obstructing the effusion of blood. The following case may be cited in proof of this statement.¹ A lunatic, about thirty-four years of age, wounded himself with a long sharp instrument on the left side of his chest. Two days afterwards, he was admitted into the Bicêtre, labouring under oppressed breathing, intermittent pulse and other serious symptoms. The wounded man stated, that he had plunged the instrument into his chest, and had not been able to withdraw it. His symptoms became more aggravated, and he died on the *twentieth day* after the wound. On inspection, the pericardium and the surrounding parts, were found inflamed ; and on opening the heart, an iron stiletto was discovered to be firmly imbedded in the substance of the left ventricle, which it entirely traversed, so that its point projected a few lines into the cavity of the right ventricle. The man had obviously died from extravasation of blood ; but this had taken place slowly, and, only after the period of time mentioned, had the hæmorrhage sufficed to destroy life.

It appears from a series of observations by M. Ollivier and others, that the right cavities of the heart are more frequently wounded than the left, and of these the right ventricle is most commonly the seat of injury. Out of sixty-four cases of wounds of this organ, twenty-nine were situated in the right ventricle, twelve in the left ventricle, nine in the two ventricles, three in the right auricle and one in the left auricle. These differences are readily accounted for by the relative situation of the cavities. It appears also, from M. Ollivier's observations, that wounds of the right ventricle

¹ ORFILA. Méd. Lég. Vol. II. p. 480.

are not only the most frequent, but of all others, they are the least rapidly mortal.¹ Some consider that the suddenness of death in severe wounds of the cavities of this organ, is to be ascribed to the degree of compression which it experiences from the blood poured out into the pericardium, and not to the mere loss of blood. It is, however, more probable that the action of the heart ceases from the loss of blood; for the effusion is rarely confined to the cavity of the pericardium; and as this membrane itself is always wounded, unless the wound be oblique and small, the blood cannot be detained within it so as to exert the fatal compression supposed.

Wounds of the substance of the heart, which do not extend into the cavities or implicate the coronary arteries, are not necessarily, though generally mortal. Death may take place from inflammation of the heart or pericardium; but even when the danger from these diseases is past, and there is every prospect of recovery, life may be suddenly destroyed by a rupture of the parietes of the organ in the situation of the wound. The least exertion has sometimes proved sufficient to cause death in this manner.

The question of the time at which death may be expected to follow a wound of the heart, is of importance in legal medicine;—as where, for instance, it is sought to determine, whether an individual could have survived to perform certain actions. The facts which have been stated, relative to the protraction of existence under these injuries, will, in some degree, serve to guide the witness in forming his opinion. When the wound is of so severe a nature, that one or more of the cavities are widely laid open, the hæmorrhage will be so profuse and sudden, that we should conceive the individual to fall dead on the spot. Such is the conclusion to which, probably, every surgeon would come from an *a priori* consideration of the fact. The only case that I have met with, which seems at all opposed to this view, is the following, reported by the editor of Beck's Medical

¹ DEVERGIE. Méd. Lég. Vol. II. p. 246.

Jurisprudence.¹ In this it will be seen, the question of survivorship was material to the prisoner.

The keeper of a brothel was tried in Glasgow, in the year 1819, for the murder of a sailor, by shooting him through the chest. It appeared from the evidence of the medical witnesses, that the auricles and part of the aorta next the heart, were *shattered to atoms* by the slugs and brass nails with which the piece was charged; and, in their opinion, the deceased must have dropped down dead on the moment that he received the shot. The body was found in the street, and the door of the prisoner's house was *eighteen feet* up an entry; so that it followed, if the medical opinion were correct, that the prisoner must have run after the deceased, and have shot him in the street. For the prisoner it was urged and proved, that he had shot the deceased through the door of his own house, which the latter was attempting to enter by force. Besides direct testimony to this effect from those within the house, and from a lad who was along with the deceased at the time, it was proved that there was a stream of blood from the door of the house to the spot where the body lay, which could not have flowed from the body towards the house, as the threshold of the door was on a higher level than the pavement of the street. On this evidence, the prisoner was unanimously acquitted.

If, by the heart being "*shattered to atoms*," we understand that its cavities were entirely laid open, and its substance destroyed, we have a description of wound which most professional men would not hesitate to pronounce instantaneously mortal. The existence of an individual after such an injury, for a period sufficiently long to enable him to run eighteen feet, must be regarded as almost miraculous. Although nothing is stated on the point, yet we must suppose it was proved, before the question of survivorship was raised, that the body of the deceased could not have been dragged after death from the door of the prisoner's house, to the spot where it was found;—a circumstance

¹ BECK'S Med. Jur. p. 334.

which would have sufficed to account for the presence of a stream of blood, notwithstanding the difference of level between the street and the door of the house. The question was of importance to the prisoner, inasmuch, as if he had shot the deceased while the latter was endeavouring to break into his house, the homicide might have been regarded as excusable; but, if after the deceased had left the house, he had run into the street and shot him, then probably this would have been considered sufficient evidence of malice to have justified a verdict of wilful murder. The jury adopted the first view of the case; and therefore, found that the deceased had actually run into the street, after having been shot through the door of the prisoner's house.

Wounds of the *large arterial and venous trunks*, around the heart, must be considered as decidedly mortal: death is instantaneous from the profuse hæmorrhage which attends them. With regard to these fatal extravasations of blood within the chest, as well as in the other great cavities, it may be proper to mention that, from whatever vessel or vessels the blood may have issued, it is not commonly found coagulated to any extent. The greater part of it generally preserves the liquid state: and it is rare that so much as one half of the quantity effused, is met with in the form of coagulum.¹ These extravasations of blood in the chest may be sometimes traced to wounds of the intercostal arteries, or of the vena azygos.

Wounds of the *œsophagus* and *thoracic duct* are extremely rare, except in combination with mortal injuries to other parts. The depth at which these organs are placed, as well as the protection afforded to them by the surrounding viscera, sufficiently explains why they should be so seldom implicated in penetrating wounds of the chest. A wound laying open the *œsophagus*, must be regarded as highly dangerous, if not necessarily fatal, from the continual extravasation of food in the chest, and the impossibility of rendering assistance. Nevertheless, a case is related by Orfila,² which terminated successfully. The *œsophagus*

¹ DEVERGIE. Vol. II. p. 25 and 45. ² Vol. II. p. 483.

had been completely traversed by a bayonet-wound passing downwards and backwards, from the upper part of the chest on the right side. That the canal had been laid open was evident from the free escape of the food through the wound. This must be considered as a remarkable exception to the general termination of such cases. Wounds of the thoracic duct are also to be regarded as necessarily leading to fatal consequences. A wound of this canal would cause the destruction of life by the extravasation of its contents, as well as by occasioning a loss of nutriment to the system.

Wounds of the Diaphragm. This muscular septum is liable to be wounded by weapons which penetrate the cavity of the thorax or abdomen; but, under any circumstances, such wounds are not likely to occur without implicating the important organs that are in contact with it. It is scarcely possible, therefore, to estimate the danger of these injuries, as the prognosis must materially depend on the concomitant mischief to the viscera. Slight penetrating wounds of the muscle may heal, like those of other muscular parts; and cases of this kind are quoted by Orfila and Smith. There is, however, always a consecutive source of mischief which no remedial means can avert, namely, that after the wound has, to all appearance, healed, the life of a party will be cut short by the strangulation of portion of the stomach or viscera in the half cicatrized aperture. An instance reported by Dr. Smith affords an illustration of this. "A sharp pointed weapon had penetrated the diaphragm, notwithstanding which the patient made a rapid and perfect recovery, to all appearance. At the end of about three months the man died from a strangulated hernia of the stomach, which had passed through the wound of the diaphragm into the thorax."

In a case of this description, where death occurs at a very considerable period after the infliction of a wound, the witness will probably be asked:—Whether the wound was the cause of death? Or whether there were any circumstances which would have caused or facilitated the

¹ For. Med. p. 279.

production of a hernia? The degree of culpability of an aggressor would materially depend upon the answers returned to these questions. Phrenic hernia, as it is termed, is not by any means an unusual or unexpected fatal consequence of a wound to the diaphragm; and therefore it would appear, at first sight, that death, at whatever period this event might occur, should be referred to the original wound. But the question is of a very delicate nature; as it is possible that a slight blow on the stomach, received subsequently to the wound, or even any moderate exertion on the part of the deceased, might have tended to the production of the strangulation, or at least might have added to its fatal effects.

The most serious wounds of the diaphragm, are unquestionably those which are produced by violent contusions, or falls on the parietes of the abdomen, while the stomach and viscera are distended. In these cases the muscular fibres are commonly found ruptured to a greater or less extent: the hæmorrhage is not very considerable, rarely exceeding two, three, or four ounces. A uniform effect of these ruptures when extensive, however, is a protrusion of the stomach into the chest, with sometimes a rupture of the coats of that organ and extravasation of its contents. These severe lacerations of the diaphragm are more readily produced during the act of inspiration, than during expiration,—the fibres of the muscle being then stretched and receiving, while in this state of tension, the whole of the force. According to Devergie, the rupture most frequently takes place in the central tendinous structure, where it is united with the left muscular portion above the crura. It is observed more commonly on the left side than on the right.¹ Besides the stomach, it sometimes happens that the liver, spleen, or intestines pass through the opening, and like it, these organs are liable to become strangulated: the lungs are, at the same time, so compressed that respiration is stopped and asphyxia is often an immediate result.

A medical jurist may be required to state the period at

¹ Vol. II. p. 250.

which these severe injuries of the diaphragm are likely to prove fatal; and whether, while labouring under them, an individual is capable of performing acts of volition and locomotion.

From the observations collected by Cavalier and Percy, who made an especial study of these injuries, it would appear that ruptures of this muscle are almost instantly mortal. Out of eight cases reported in M. Devergie's work, seven were attended with the immediate destruction of life.¹ In one of those, in which death was not immediate, the injured party fell from the dome of the Invalides on some scaffolding. Six months afterwards he was killed by another accident; but, during the whole of this period, he was constantly troubled with a cough, difficult respiration and continual pain in the left side of the chest. On inspection, the diaphragm presented a laceration two inches and a half in extent, through which the stomach and the arch of the colon protruded into the chest. The margin of the laceration was cicatrized. The heart was displaced; and the left lung, considerably reduced in bulk, was pushed towards the upper part of the thoracic cavity.

In this case the man did not die until four days after the second accident, which was a fall from a height of twenty feet, attended with the fracture of seven ribs. So far as the details go, it is not impossible that the rupture of the diaphragm was the result of the last accident and not of the first. The case, therefore, does not appear to prove satisfactorily that a man may survive so serious an accident for a period of six months: although it undoubtedly shews that death is not always an *immediate* result. The following instance also proves that life may be protracted under these severe injuries. A healthy and vigorous man, in attempting to mount a coach, pulled it over and fell under it. He was taken to the Hôtel Dieu on the third day after the accident, the right thigh was found to be fractured, but no alarming constitutional symptoms were present. The pulse was natural, *the respiration not oppressed*; and the only annoyance was a teasing cough, accompanied by copious expectoration.

¹ Vol. II. p. 196.

He unexpectedly sank on the *sixth day*. On dissection it was observed, when the sternum was raised, that a portion of the intestines escaped from the thorax. The left lung was forced up to the top of that cavity: the diaphragm had been detached from its adhesion to the sternum and ribs, to a considerable extent; and through this large aperture the bowels had protruded. There was also another smaller rupture of the diaphragm, beginning at its point of attachment to the last true rib of the left side, and extending to the corresponding crus of the muscle.¹

In the case which I am now about to present to the reader, and which occurred recently in France, an important question relative to the survivorship of a person after a rupture of the diaphragm, was raised.²

Three men, half intoxicated, were attacked by a fourth, while returning from a fair. About an hour afterwards, and after walking half a league, they reached the house of a medical practitioner. The two youngest were but slightly injured: the deceased, who was the eldest of the party, made no complaint,—he did not even speak, but sat resting his head upon his hands, with his elbows on his knees. When his companions had been attended to by the surgeon and had departed, he followed; and it was observed that although he walked slowly, he reached the door without stumbling: this was about six o'clock in the evening. From further evidence, it appeared that the three men remained an hour and a half in the town: but it was remarked that the deceased seemed dull, and scarcely answered a question,—his look presented nothing extraordinary,—he made no complaint, nor did he seem to be in any pain. During this time he attempted to vomit, but without effect. The three men now returned homewards, and when half way on the road, according to the statement of the other two, the deceased fell, in a state of exhaustion and insensibility; this was at nine o'clock, and therefore about four hours after the receipt of the violence. When seen the next morning, he was comatose, and continued so until his death, which

¹ JOHNSON'S Med. Chir. Review. April 1835.

² DEVERGIE. Médecine Légale. Tome II. p. 187.

happened at one o'clock in the day. While lying in a state of coma, it was remarked that his respiration was hurried and difficult ;—that the chest was violently drawn upwards, but there seemed to be no corresponding expansion of the lungs, and the act of inspiration was accompanied by a mucous rattle. It being supposed that the deceased had died in consequence of the violence, an inspection was ordered to be made by the legal authorities ; and this accordingly took place forty-four hours after death.

The body was free from all appearance of ecchymosis, contusion, or other marks of injury. The scalp was found to be infiltrated with blood posteriorly, and a slight sanguineous extravasation was seen over the centre of the left parietal bone. On removing this, the bone was observed to be fractured in a radiated form :—the fracture extended through both parietal, the occipital, the sphenoid, the frontal and the right temporal bones. The scalp over the centre of the fracture bore no mark of contusion or laceration : but immediately beneath it, on the surface of the dura mater, there were about two ounces of coagulated blood. The brain presented no morbid alteration. On opening the abdomen, it was seen that the diaphragm had been ruptured in a longitudinal direction about its centre ; and that the great end of the stomach protruded through the aperture into the left side of the chest. The rupture was about two inches and a half in extent, and was evidently recent : the margin was still bloody,—there was no adhesion between it and the surface of the stomach. On examining the left side of the chest it was found that the stomach itself was ruptured ; and that its contents, which were in large quantity and mixed with coagula of blood, had escaped into the cavity of the left pleura. There was no extravasation in the abdomen, and the other abdominal viscera were in their normal state. The left lung had been pushed considerably upwards ; and that portion of pleura in contact with the extravasated matters, was in a highly inflamed state.

Now the chief question which the medical witness had to

solve, was,—whether the deceased could have lived *twenty hours* after the receipt of such injuries, and have walked upwards of a league without complaining or appearing to suffer any considerable pain? If the question were answered in the affirmative, it would follow that the person who attacked him and his companions on their way from the fair, would be responsible;—but, if in the negative, then some other aggressor or aggressors must be looked for. M. Davat, the surgeon who had the care of the case, thought that the injury to the head, might have been caused by the violence received by the deceased before he and his companions reached his house. The absence of serious symptoms, and the power of walking afterwards, did not contravene this conclusion; but with regard to the ruptures of the diaphragm and the stomach, without denying the possibility of their having been produced at the same time as the injury to the head, he thought it rather improbable.

M. Devergie, in commenting on the facts of this singular case, gives it as his opinion, that the deceased could not have laboured under the injury to the diaphragm, when he was first seen by M. Davat. He contends from past experience, that death is almost an immediate consequence of this accident; and in those few cases, in which the individual has survived the injury for any period, its existence has been denoted by the most serious symptoms. Here, however, he observes, “a man is stated to have been capable of walking for two hours, and of remaining another hour in a town with a fracture of the skull,—a rupture of the diaphragm and stomach,—an extravasation of the contents of the latter amounting to more than a pint,—and a compression of the left lung, without presenting any symptom indicative of the existence of such severe injuries.” If these statements were taken abstractedly, that is to say, without a due consideration of the other facts proved, we might be inclined to agree with M. Devergie, and to suppose that the man did not meet with the rupture of the diaphragm, until after he had quitted the house of M. Davat,—therefore, that his companions must have been chargeable with his death. But, unless a medical jurist, in forming an opinion, takes

every fact into account, he is liable to err. It is a matter of surprise, that the deceased survived the injuries a *single hour*;—most surgeons would probably assign a shorter period than this for the extinction of life under such circumstances, were they to decide from ordinary experience. But M. Devergie tacitly admits, that the deceased must have survived the violence *at least fifteen hours*; for the comatose symptoms came on at nine o'clock, and the deceased did not die until one o'clock of the following day; besides, the inflammation of the pleura shewed, that the extravasated matters must have been some time in contact with it. We may then dismiss the question, so far as the length of the period which the individual survived, is concerned; for if it be admitted, that the man lived *fifteen* hours, there can be no great obstacle to the admission, that he might have lived *nineteen*. The absence of symptoms in the deceased indicative of serious mischief, and his power of walking, might seem to afford stronger reasons for adopting the opinion of M. Devergie: but a case was just now related, (p. 457) in which an individual survived a rupture of the diaphragm six days, and no suspicion of the nature of the accident was entertained until the body was inspected. It is true, that the intestines in that case, were not ruptured, and there was no extravasation; but it is exclusively of the effects of ruptures of the diaphragm, of which we are now speaking. The rupture in that instance existed to a large extent, the individual survived six days, and there were no symptoms to indicate the nature of the injury. So, in the case we are examining,—the deceased appeared to sink and die from the effects of violence to the head; and M. Davat does not seem to have been led by the symptoms to suspect, that the diaphragm or the stomach had been ruptured. The circumstance of the deceased having walked for two hours with such internal injuries, is indeed extraordinary; but if there was no proof of his having been violently treated after leaving the house of M. Davat, we are not to pronounce it impossible, and thereby throw a suspicion upon men with whom he was in company, merely because the act was

something unusual as a matter of medical experience. Had there been any evidence to render it probable, that the deceased's companions had maltreated him on their way home, then we might hesitate to give so affirmative an opinion; but the details of the case, as furnished by M. Devergie himself, afford no grounds whatever for this supposition: and we have surely, therefore, no right, in the absence of this evidence, to draw an inference so prejudicial to these persons. This appears to have been the view taken by the senate of Chambéry. They found the man, who had maltreated the deceased and his companions, guilty, and condemned him to the galleys for seven years.¹

Wounds of the Abdomen.—Incised and punctured wounds which affect the parietes of the abdomen, without penetrating the cavity, are not quite of so simple a nature as might at first sight be imagined. The danger is immediate, if the

¹ The case of Danks, given a few pages back, might here serve as an instructive commentary. In that instance there was a realization of what, if tried by the ordinary rules of art, would have been pronounced *impossible*. A medical jurist cannot be too cautious in drawing the line between what is possible and impossible, in questions relating to the mortality of wounds: since the records of surgery abound in cases, which seem to occur in order to shew the futility of attempting to decide by general rules. Some years ago, a man recovered after having had his chest traversed from the left to the right side by the shaft of a gig: but as more pertinent to the question before us, I will relate a well-authenticated case, which occurred in this country in the year 1833. A boy accidentally inflicted a gun-shot wound in his chest, by which a piece of wood, *three inches long*, was forced into that cavity. Immediately after the accident, the boy walked home, a distance of about forty yards. When seen by a medical man, he was faint from the loss of blood, but complained of no pain. In the first fortnight, he appeared to be recovering, being able to walk into his garden and employ himself; but he died at the end of five weeks. On opening his body, *the stick was found lodged in the heart*, one end pressing against the extreme apex of the right ventricle and fixed between the *carneæ columnæ*,—the other end, which was encrusted with a thick coagulum of blood, resting upon the auriculo-ventricular valve. This case appears to me even more extraordinary, in regard to survivorship, than that of M. Davat. There are few surgeons probably, who, if asked to give an *a priori* opinion from these facts, would not pronounce it to be impossible that an individual, so situated, should live five weeks, and be able to move about and exert himself.—Vide Med. Gaz. Vol. XIV. p. 344; also Trans. of Prov. Med. and Surg. Ass.

epigastric artery be wounded; for a fatal hæmorrhage will, in some instances, take place from a wound of this vessel. In a case which occurred to Dr. Colles, of Dublin, a carpenter who had a chisel in his pocket, stumbled in walking and received a wound in the abdomen with the edge of the instrument. When brought to the hospital, the man appeared exhausted from the loss of blood,—the skin was cold and pallid; he gradually became weaker, the pulse imperceptible, and he died a few hours after his admission. On an examination of the body, the epigastric artery was found divided, and the cavity of the peritoneum distended with blood. It is true, that in this case, the abdomen was penetrated; but the real cause of death was the blood lost from the wounded artery. Mr. Travers mentions, that a man was brought to St. Thomas's hospital, who had been stabbed in the direction of the epigastric artery on the left side of the abdomen, with a case-knife. He died in eighteen hours, apparently owing to copious hæmorrhage from that vessel.

Among the other sources of danger from these superficial wounds, is inflammation, followed by suppuration beneath the tendinous aponeurosis which covers the abdominal muscles. The matter formed is very liable to accumulate within the tendinous sheath of the rectus muscle, and go on to destroy life, unless proper treatment be adopted. The inflammation will sometimes extend to the peritoneum, and thus prove rapidly mortal. As improper medical treatment may, in either of these ways, cause a superficial wound of the abdomen to take a fatal termination,—so when an individual stands charged with having inflicted a wound, will it be necessary for the medical witness to consider how far the consequences of the act of the prisoner have been aggravated by negligence or unskilfulness.

But when these wounds take a favourable course and heal, there is an after-effect to be dreaded, namely, a protrusion of the viscera at the cicatrized spot, constituting ventral hernia. When the wound has involved the muscular fibres transversely to their course, the cicatrix which follows, is commonly far less capable of resisting the pressure of the

viscera within, than other parts of the parietes. A hernia will take place, and this like other herniæ, if neglected, is liable to become strangulated and lead to the destruction of life.

Contusions are attended generally with far more serious effects on the cavity of the abdomen, than on the thorax. This arises from the abdominal parietes having less power of resisting external shocks. In the first place, death may be an immediate result of a blow in the upper and central portion; no particular morbid changes will be apparent on inspection, and the violence may have been so slight, as not to have left any ecchymosed mark on the skin. Death has been ascribed in these cases to a fatal shock transmitted to the system, through a violent impression produced on the solar plexus. The viscera within, or the great vessels of the abdomen, are also liable to be ruptured by external violence, insufficient to produce any lesion of the parietes. Of all the internal organs, the liver and spleen are the most exposed to rupture, owing to their very compact structure, which prevents them from yielding to a shock, like the hollow viscera. Ruptures of the *liver* from falls or blows, according to Devergie, are generally seen on the convex surface.¹ They seldom extend through the whole substance of the organ, but consist of fissures, varying from one to two inches in depth. Their general direction is from before backwards, with a slight obliquity; they are rarely seen intersecting the liver transversely. The lacerated edges are not much separated, while the surfaces present a granular appearance. But little blood is met with in the laceration; it is commonly found extravasated in the lower part of the cavity of the peritoneum, or in the hollow of the pelvis, and it is only in part coagulated.² Ruptures of the liver, unless they run far backwards and involve the vena cava, are not in general attended with a considerable extravasation of blood; but the hæmorrhage, should this vessel be implicated, is sufficient to cause the instant

¹ Dr. MALE met with an instance in which the liver was ruptured merely by the sudden action of the abdominal muscles. The individual was endeavouring to avoid a fall from his horse.—Jur. Med. p. 119.

² DEVERGIE. Méd. Lég. Tome II. p. 45.

destruction of life. When the *spleen* is ruptured, the lacerated portions of the organ, instead of being rough and granular, commonly present a smooth and uniform surface.¹ The hæmorrhage, especially if the splenic vein has been at all involved in the injury, may prove rapidly fatal. The *kidneys*, from their comparatively exposed situation, are liable to be ruptured from a blow posteriorly. In a case mentioned by Dr. Smith, the right kidney was torn in two transversely, and the person died in twenty minutes.² A blow on the abdomen of a female far advanced in pregnancy, may prove fatal by causing an immediate shock to the system, or a rupture of the uterus; again, abortion may take place; and the death of the female ensue during the process. In the following case,—singular on account of the weapon employed, death was caused by a violent impression produced on the system.

John Bond was indicted for the murder of his wife, by beating her with a codfish. The prisoner, who was intoxicated, desired his wife to cook the fish, which weighed about six pounds; she refused, because it was an unseasonable hour, and there was no fire. He seized the fish, and then beat her over the abdomen for some minutes with extreme violence. She died in a very short time afterwards, and on a post-mortem examination, the marks of many bruises were found on her body. The deceased was in the last month of pregnancy; and, in the opinion of the practitioner, her death was occasioned through the shock imparted to the system by the violence of the prisoner. He was found guilty of manslaughter and sentenced to transportation for life.³

In a case mentioned by Smith, a man used violence to the abdomen of his wife while pregnant, for the express purpose of procuring abortion. This accordingly took place, and the woman died. The prisoner was tried and executed for the murder, at Stafford in 1811.⁴

¹ Méd. Lég. Tome II. p. 45.

² For. Med. p. 283.

³ Norfolk Circuit, Cambridge, March 1835: before Lord Abinger.

⁴ For. Med. p. 325.

The hollow viscera of the abdomen, such as the stomach, intestines and bladder are not much exposed to rupture from contusions, unless they are in a distended state.

Ruptures of the stomach are not very common; when they occur, they generally take place in the direction of the shorter axis of the organ,—from before backwards. The rupture may affect either the mucous or serous tunic, or both,—the muscular coat remaining uninjured:¹ in other instances, the whole of the tunics are ruptured, and the cavity of the organ is laid open. In the latter case, which is the more serious, if the stomach be at the time empty, adhesion may possibly take place to the surrounding viscera:—but should the organ be full, extravasation of its contents is an immediate consequence; and if the individual survive the shock, fatal peritonitis will manifest itself. The same remarks are applicable to ruptures of the intestines, which are still less frequent than those of the stomach, from the greater freedom of motion which they possess; but, nevertheless, the application of any powerful crushing force to the abdomen, is very likely to be followed by this accident. Ruptures of the intestines generally terminate fatally. Two cases have been described by Mr. Ellis, of Dublin:—in one, a rupture of the cœcum, the man was able to walk after the accident, but serious symptoms speedily manifested themselves and he died in twenty-four hours. On an examination of the body, an aperture in the cœcum was discovered, so small that it only admitted the extremity of the little finger. There was no extravasation of fæces; the coats of the intestine were dark-coloured and thickened, and the peritoneum around was inflamed. In another case, that of a girl aged four years, the duodenum was found ruptured, and an extravasation of its contents had taken place; the lower extremity of the spleen was also lacerated, and a small quantity of blood had become extravasated. The girl died in five hours after the accident:—there was no mark of peritoneal inflammation, nor was the hæmorrhage sufficient to account for death. As Mr. Ellis observes, we must,

¹ DEVERGIE. Tome II. p. 46.

in these rapidly fatal cases, ascribe death to the violent shock produced on the system.

Ruptures of the bladder, when this organ is in a distended state, are a very usual consequence of blows on the lower part of the abdomen. They are commonly observed to occur in the upper and posterior part of the viscus, where it is covered by the peritoneum: this membrane becomes lacerated, and the urine is then extravasated within its cavity. The great danger of these accidents is to be ascribed to the inflammation which is excited by the presence of this irritating liquid. In one case, described by Mr. Ellis, death took place on the fifteenth day after the accident; and, on dissection, between two and three gallons of pale urine were found within the cavity of the abdomen: in a second case, death took place on the third day. These injuries are almost uniformly fatal. Baron Dupuytren met with an instance in which the individual did not die until the seventh day. On inspection it was found that a process of reparation had been commenced, and the case would not probably have terminated fatally, but for the man's own imprudence in neglecting the regimenal regulations under which he was placed.¹

Wounds penetrating the abdomen, without involving the viscera, are dangerous for several reasons. They may be attended with the extravasation of blood internally, which, if insufficient to destroy life directly, may ultimately give rise to peritonitis, under which the wounded party will die. Should the effusion of blood be inconsiderable, still a wound simply penetrating the cavity, is very liable to be followed by peritoneal inflammation. On the other hand, the viscera may protrude through a wound, and become strangulated or otherwise injured before assistance can be procured. In this case, the least serious consequence to be apprehended is an artificial anus. Weapons which penetrate the abdomen, may inflict wounds on the different organs contained within; and these we will now proceed to consider briefly, commencing with the stomach.

¹ Archives Gén. Juin. 1834. Vide also Med. Gaz. Vol. XIV. p. 831.

Wounds of the Stomach.—Wounds of this organ are highly dangerous, but they are not always mortal. A wound which involves the middle portion of the viscus, is *cæteris paribus* less dangerous than a wound of either extremity. The chief sources of danger are—I. Hæmorrhage, which will depend on the situation of the wound, and the number of vessels divided. II. The shock imparted to the system, which alone is sometimes sufficient to destroy life. In the following instance, reported by Mr. Ellis, this seems to have been the cause of death. A man was stabbed in the abdomen by his brother during a quarrel: death took place in twenty-one hours, and on inspecting the abdomen, a wound about half an inch in length, was found in the stomach situated two inches from the pyloric orifice. A small quantity of blood, but no food, was found extravasated; and there were scarcely any traces of peritoneal inflammation. The constitution had doubtless sunk sympathetically, the fatal result having been probably accelerated by the loss of blood. III. A third source of danger is the inflammation which is liable to supervene, and which will sometimes destroy life in spite of the best treatment. IV. A wound of the stomach may prove mortal in a distended state of the organ, by an extravasation of its contents, giving rise to a fatal attack of peritoneal inflammation. It must be remembered, however, in respect to the last-mentioned complication of wounds of the stomach, that an extravasation of the contents of this viscus or of the intestines, is not a necessary consequence of a wound of these parts, although they may be at the time full. A satisfactory reason for this has been assigned by Mr. Travers.¹ This observation chiefly applies to stabs; for of course, if the wounds be extensive, extravasation may be fairly expected to take place. In a case recorded by Baron Dupuytren, of death supervening on a wound of the heart (p. 448), it was observed, that the stomach was implicated in the abdominal injury. There was a wound on its great curvature, two lines in length, penetrating into the cavity of the organ; the edges were almost in contact, partly

¹ Injuries of the Intestines.

agglutinated and closed by mucus. The stomach contained no blood, and was not inflamed. There was no effusion into the peritoneum, which remained perfectly healthy. It was stated, that this man survived seven days; and from the post-mortem examination it appeared, that the wound of the stomach was making favourable progress and would probably have healed, had not life been cut short by co-existing disease.¹

In the healing of a wound of this organ, an adhesion may take place between its edges and the external orifice by which the weapon entered, so that a fistulous opening will remain. Death might in such a case be a slow result from inanition.

Wounds of the Intestines.—The small intestines and the transverse arch of the colon, are those parts of the intestinal canal which are most exposed in penetrating wounds of the abdomen. These lesions are neither necessarily mortal, nor are they always accompanied by extravasation. The abdomen has been completely traversed by a sword-wound,—the intestines have been perforated, and yet a curative process has speedily established itself, and the wounded party has recovered. When extravasation of fæces takes place, it is more commonly seen in wounds of the small, than in those of the large intestines; because, in the former, the excrementitious matter is more liquid. Extensive wounds of the small intestines generally prove mortal, especially when they involve the duodenum or the jejunum. A wounded party may die from hæmorrhage, from inflammation of the part, or from peritonitis induced by their extravasated contents. If the chylous matter should escape externally, then the individual may slowly perish from marasmus; of course, in such a case, the nearer the injured intestine is to the stomach, the more rapidly will this fatal consequence ensue.

¹ Professor MARTINI, of Turin, thus sums up the effects of wounds of this organ;—"Non tutte le ferite dello stomaco sono mortali: nè le mortali il sono egualmente. Le leggiere superficiali lasciano qualche raggio di speranza. Le ampie, vicine agli orifizi, sono assolutamente mortali." *Int. alla Med. Leg.* Vol. II. p. 323.

When the intestine is completely divided in a transverse direction, the diagnosis is very unfavourable; nevertheless, some extraordinary cases are on record of cures having been effected, even under these circumstances. If the intestines have been violently torn by a weapon, then death is commonly an immediate result: or should an individual survive the first shock, from the lacerations not being very considerable, a fatal result is sooner or later brought about by the extravasation of excrementitious matter, and subsequent inflammation of the peritoneum. It is necessary to remember, that in wounds of the intestines, death may sometimes take place from a simple shock to the system. An individual will die before inflammation has set in; and after death, no extravasated matters will be discovered. Some have imagined that this fatal influence by sympathy, is more strongly manifested, in proportion as the wound of the alimentary canal approaches nearer to the solar plexus of nerves.

If the weapon should penetrate the layers of the *mesentery*, then it commonly happens that the wound proves speedily mortal from the abundant hæmorrhage which ensues.¹

Wounds of the Liver.—Penetrating wounds of this organ are commonly fatal when the weapon extends deeply into its substance, in consequence of the division of some of its numerous blood-vessels. If death do not ensue on the spot from hæmorrhage, inflammation and suppuration of the organ are liable to follow, under which the patient may sink. Should the wound not extend deeply into the substance of the liver or implicate any large vessel, there is a very fair possibility, with proper management, of restoring the patient. The *gall-bladder*, from its being deeply buried under the concave surface of the liver, is but little exposed to injury in penetrating wounds of the abdomen. When it is distended with bile, its fundus projects forwards,

¹ "Le ferite delle intestina, sono meno gravi che quelle del ventricolo. Le ferite intestinali sono più gravi nelle intestina tenui che nelle grosse. Le trasversali sono più gravi delle longitudinali. Le ferite del mesenterio e dell'omento, non sono mortali per sè: ma possono divenir tali per l'infiammazione sussecutiva, e per la lesione di vasi e di nervi cospicui." MARTINI. Ibid.

and then a weapon might readily reach it. A wound of this organ is immediately accompanied by an extravasation of bile in the peritoneum, and the patient ultimately falls a victim to peritonitis. If the fundus of the bladder be adherent to the peritoneum of the abdominal parietes, it is possible that it may be wounded without an extravasation of bile taking place internally. Wounds of the gall-bladder have been regarded as absolutely mortal, solely from the irritating properties of the extravasated bile. There are one or two instances on record of recovery after a supposed wound of the gall-bladder; but the details do not appear to establish satisfactorily, that the bladder had really been wounded.¹

Wounds of the Spleen.—Deeply penetrating wounds of this organ, are commonly fatal from hæmorrhage, which usually takes place to a large extent, in consequence of its vascular and spongy structure. A superficial wound of the spleen is not necessarily mortal. A wound of the *pancreas* is dangerous in proportion to the accompanying hæmorrhage; but it is rare that this organ is wounded without some more important lesion of the viscera by which it is covered and protected.

Wounds of the Kidneys.—These, when deep-seated, prove fatal from one of two causes,—either from an extravasation of blood by the weapon touching the renal vessels, or from an extravasation of urine into the cavity of the peritoneum, by its penetrating into the pelvis of the organ or involving the ureter. Should the wound not prove immediately fatal from hæmorrhage, the patient may die from subsequent inflammation of the kidney. These organs are most exposed to wounds from behind; and there are several instances on record, where stabs in the lumbar region involving the kidney, have been recovered from. Great management is required in the treatment on these occasions, to prevent the infiltration of urine into the peritoneum, when the party survives the first effects of the injury. The following case of recovery from a wound of the kidney, is extracted from Dr. Beck's work.² A boy at the Cape of

¹ COOPER'S Surg. Dict. Wounds.

² Med. Jur. p. 338.

Good Hope, received a deep wound in the left kidney, from a butcher's knife, which was thrown at him. The surgeon, under whose care he fell, caused him to be placed and retained in such a position that the wound should be in the most depending part of his body. This allowed a free escape of the urine to take place externally, and, in a short time, the boy completely recovered.

Penetrating wounds of the *bladder* are commonly witnessed in a distended state of the organ, in which case, extravasation of urine and its consequences are liable to cut short life. Should there be no extravasation, still such wounds are liable to prove mortal from inflammation of the peritoneum.

Wounds of the Genital Organs.—The penis may be in part, or altogether, removed by a cutting instrument, and here, the chief source of danger is hæmorrhage, which, in some instances, might suffice to destroy life. If, however, the flow of blood be arrested, the wounded part will commonly heal without much difficulty, and the patient recover. The same observation may be made with respect to the removal of one or both testicles. An incised wound, involving the urethra and scrotum, is liable to be followed by extravasation of urine into the cellular membrane, and this, by sloughing,—under which secondary effect, the life of the patient may be destroyed. Incised or penetrating wounds of the testicles, are not dangerous when properly treated; although disease might be subsequently set up, which would render the amputation of one or both organs necessary. Contusions of the testicles, if severe, are much more to be dreaded;—a violent shock on the nervous system is in the first instance produced; but inflammation of the organs is an after-consequence, under which a patient may sink. A division of the spermatic cord, is also liable to prove dangerous from the hæmorrhage which ensues.¹ Volun-

¹ The following aphorisms have been laid down by MARTINI, in respect to these wounds. “Le lesioni dei testicoli sono sempre pericolose. Una violenta contusione può divenire mortale. La divisione di essi non fu sempre susseguita da morte. Ma mortale fu sempre la divisione del cordone spermatico.” Vol. II, p. 326.

tary mutilations of the genitals are not uncommon among individuals suffering from monomania; and it has been often observed, that but little hæmorrhage has ensued, in consequence of the bluntness of the weapon employed. Such cases are rarely known to terminate fatally. Wounds involving the clitoris and labia minora of the female organs, if extensively incised, are liable to destroy life by hæmorrhage. Wounds, attended with fatal consequences, may be inflicted on the bladder, rectum, or uterus, by the passage of sharply-pointed weapons up the vagina: in some instances, death may be immediate on the puncture or division of any of the large blood-vessels of the pelvis. The medical jurist will observe, that this is a case in which life may be destroyed without leaving the least trace of external violence.

LEGAL RELATIONS OF WOUNDS.

The statute which chiefly relates to the punishment of persons for wounds wilfully and unlawfully inflicted, is that which was passed in the ninth year of the late king:—9 Geo. IV. cap. 31.¹ This statute also prescribes the punishment for those who attempt to destroy life by other means than wounding; and therefore the quotation of some of its sections in this place, must be considered as having a general reference to the various forms of criminal violence, which have been treated of, or remain to be treated of in the future part of the work.

Punishment of Principals and Accessories in Murder.

Section 3.—“And be it enacted, that every person convicted of murder, or of being an accessory before the fact to murder, shall suffer death as a felon; and every accessory after the fact to murder, shall be liable, at

¹ The Acts and parts of Acts, relating to murder, manslaughter and maiming, repealed by this statute, are—9 H. III. c. 26; 52 H. III. c. 25; 3 Ed. I. c. 11; 6 Ed. I. c. 9; 5 H. IV. c. 5; 2 Hen. V. st. 1; 33 H. VIII. c. 12; 1 Ed. VI. c. 12; 4 & 5 P. & M. c. 4; 1 Jac. I. c. 8; 22 & 23 C. II. c. 1; 2 Geo. II. c. 21; 25 Geo. II. c. 37; 43 Geo. III. c. 58; 43 Geo. III. c. 113; 3 Geo. IV. c. 38. By the 38th section of the Lansdowne statute, it is provided and enacted, that nothing therein contained, shall extend to Scotland or Ireland.

the discretion of the Court, to be transported beyond the seas for life, or to be imprisoned with or without hard labour, in the Common Gaol or House of Correction, for any term not exceeding four years."

Period of Execution, &c.

Section 4.—"And be it enacted, that every person convicted of murder, shall be executed according to law, on the day next but one after that on which the sentence shall be passed, unless the same shall happen to be *Sunday*, and, in that case, on the *Monday* following: • • • and sentence shall be pronounced immediately after the conviction of every murderer, unless the Court shall see reasonable cause for postponing the same: • • • Provided always that, after such sentence shall have been pronounced, it shall be lawful for the Court or Judge to stay the execution thereof, if such Court or Judge shall so think fit."

Punishment of Manslaughter.

Section 9.—"And be it enacted, that every person convicted of manslaughter, shall be liable, at the discretion of the Court, to be transported beyond the seas for life, or for any term not less than seven years, or to be imprisoned with or without hard labour, in the Common Gaol or House of Correction, for any term not exceeding four years, or to pay such fine as the Court shall award."

As to Homicide not felonious.

Section 10.—"Provided always, and be it enacted, that no punishment or forfeiture shall be incurred by any person, who shall kill another by misfortune, or in his own defence, or in any other manner without felony."

Attempts to murder, when evidenced by certain acts, shall be capital.

Section 11.—"And be it enacted, that if any person unlawfully and maliciously shall attempt to administer to any person, or shall cause to be taken by any person, any poison or other destructive thing; or shall unlawfully or maliciously attempt to drown, suffocate, or strangle any person, or shall unlawfully or maliciously shoot at any person, or shall, by drawing a trigger, or in any other manner, attempt to discharge any kind of loaded arms at any person; or shall unlawfully and maliciously stab, cut or wound any person, with intent, in any of the cases aforesaid, to murder such person, every such offender, and every person counselling, aiding, or abetting such offender, shall be guilty of felony, and being convicted thereof, shall suffer death as a felon."¹

¹ Under the Ellenborough Act, to support an indictment for stabbing with intent to murder, malice against the individual was not essential,—

Shooting at, or stabbing, cutting, or wounding any person with intent to maim, &c., shall be capital, provided the case would have been murder if death had ensued.

Section 12.—“ And be it further enacted, that if any person, unlawfully and maliciously, shall shoot at any person, or shall, by drawing a trigger, or in any other manner, attempt to discharge any kind of loaded arms at any person, or shall unlawfully and maliciously stab, cut, or wound any person, with intent, in any of the cases aforesaid, to maim, disfigure, or disable such person, or to do some other grievous bodily harm, to such person, * * * every such offender, and every person counselling, aiding, or abetting such offender, shall be guilty of felony, and being convicted thereof, shall suffer death as a felon. Provided always, that in case it shall appear on the trial of any person, indicted for any of the offences above specified, that such acts of shooting, or of attempting to discharge loaded arms, or of stabbing, cutting, or wounding as aforesaid, were committed under such circumstances, that, if death had ensued therefrom, the same would not in law have amounted to the crime of murder; in every such case the person so indicted, shall be acquitted of felony.”

It is unnecessary here to state what renders homicide justifiable or excusable in law. Murder¹ and manslaughter are the two offences on which medical evidence is required, where the life of a party has been destroyed by wounds. On the trial of an indictment for murder, the jury may find the prisoner guilty of manslaughter only, for the principal matter is the *killing*; and the malice is only a circumstance in aggravation. And, if the manner or means of death, proved at the trial, agree in substance with the means charged in the indictment, it is sufficient, as where the indictment is for killing with a dagger, and the evidence proves a killing with a staff; or if the indictment be for

general malice was sufficient. And a grievous bodily harm was not required to be done;—the intent was sufficient. *Rex v. Hunt*. Nor was it required that the wound should be near a vital part, or of a nature likely to cause death. *Rex v. Griffith*. CARRINGTON'S Criminal Law. p. 79.

¹ The name of murder, as a crime, was anciently applied to the secret killing of another, which the word “*moerda*” signifies in the Teutonic language; and it was defined—*homicidium quod nullo vidente, nullo sciente, clam perpetratur*. BLACKSTONE.

killing with one sort of poison, and the evidence proves the killing with another: such evidence maintains the indictment, because the proof of the indictment is not absolutely necessary to the proof of the fact itself. But if the charge is for poisoning, and the death is proved to have been caused by striking or starving, &c., this evidence would not support the indictment, as the species of death in the one case, is totally different from that in the other.¹ The killing, observes Blackstone, must be committed with malice aforethought, to make it the crime of murder. This is the grand criterion which now distinguishes murder from other killing; and this malice prepense, *malitia præcogitata*, is not so properly spite or malevolence to the deceased in particular, as any evil design in general,—the dictate of a wicked, depraved, and malignant heart.² In this form, it has been sometimes called constructive malice, or malice in law. The law itself is capable of inferring malice from the circumstances found by the jury, without their special finding of an actual intention to destroy the deceased.³ Malice is sometimes to be inferred from the means used by the prisoner, as where a weapon, capable of inflicting deadly mischief, is employed under the pretence of chastisement; or where the *measure* of punishment has been much greater than the circumstances of the case would justify. Even where provocation has existed, malice may be inferred from the manner in which the provoked party revenges himself on his adversary. Thus the administration of poison is, of itself, a proof of deliberate malice. So again, the manner of using a weapon may betray the maliciousness of the heart. A case was tried on the Norfolk Spring Circuit, 1835, in which the prisoner was charged with manslaughter. It was proved that on some provocation, he had stabbed his brother seven or eight times successively, with a table-knife. The deceased speedily died of the wounds. The judge remarked, that the case presented a very narrow line

¹ PHILLIPPS on Evidence. Vol. I. p. 203; also ARCHBOLD's Pleading and Evidence in Criminal Cases, p. 210.

² Commentaries. Vol. IV. p. 198.

³ STARKIE, Op. Cit. Vol. II. p. 950.

between manslaughter and murder; for, although the prisoner had received great provocation, and had struck the blows in the heat of passion, yet the frequently repeated stabs shewed so much malice, as almost to justify a charge of wilful murder.

The distinction between murder and manslaughter, in the time of Bracton, who lived in the reign of Henry III., was in a great degree nominal. The punishment of both was the same; for murder as well as manslaughter, at common law, had the benefit of clergy: and therefore none but unlearned persons, who, as Blackstone observes, least knew the guilt of the crime, were put to death for it.¹ There was indeed a species of manslaughter, which, until within a very recent period, was liable to be punished as murder, the benefit of clergy having been taken away from it; namely, the offence of mortally stabbing another, though done upon sudden provocation. For by statute 1 Jac. I. c. 8. "when one thrusts or stabs another, not then having a weapon drawn, or who hath not then first stricken the party stabbing,—so that he dies thereof within six months after, the offender shall not have the benefit of clergy, though he did it not of malice aforethought." This statute, which was only of a temporary nature, long outlived the mischief that it was intended to remedy. It became finally repealed by the 9th Geo. IV. c. 31.

On an indictment under the above statute, while it continued in force, it was always necessary to prove that the wounded party had died of the wound within six lunar months from the time he received it,²—so that if he did not

¹ BLACKSTONE. I. p. 129. IV. p. 201.

In the time of the Saxons every offence was considered in the light of a civil injury, and the object of the laws was to repair the fault, rather than to punish the offender. There was, therefore, no distinction made between things done with deliberate malice, and those done in the heat of passion or by inadvertence,—a kind of lenity, which, however admissible in a rude and simple state of society, was soon found to be inadequate to the purposes of good government. Hence, subsequent legislators added other penalties, and punished crimes not merely as private injuries, but as public offences. CRABB'S History of the English Law. p. 37.

² ARCHBOLD'S Criminal Pleading. p. 239.

die until the seventh month, although the wound might have been the immediate cause of death, the aggressor could not be convicted under it. This principle of establishing a distinction in an offence, according to the time at which a wound proves fatal, has been already alluded to (p. 305); and an attempt was then made to shew that such legislation was highly impolitic. A person with strong constitutional powers might survive the effects of a wound beyond the legal period, or one whose system was weak might sink from its effects within that period: so that under the operation of a law of this kind, the punishment of a prisoner would not be regulated by his *intent* and the *actual result* of his crime, but by the supervention of accidental circumstances, over which he could not possibly have the least control. Although, in so far as relates to this statute, the principle has been expunged from our criminal code, there is still a remnant of it preserved, which is worthy of a brief consideration. On a trial for *murder*, at common law, it is necessary to prove, that the deceased died within a year and a day after the stroke received; in the computation of which, the whole day upon which the hurt was done, is reckoned the first.¹ The most singular part of this provision, in a medico-legal point of view, is the reason assigned for it. Thus it is said, if the wounded party die *after the lapse of a year and a day*, the law will presume that his death has proceeded from some other cause than the wounds.² Such a reason might justify the continuance of this rule, if medical science had remained stationary,—at the point where it stood in a rude and barbarous age, when this kind of legislation first received existence. Our forefathers, in the absence of satisfactory evidence of the connection of death with a wound, were justified in fixing a time, beyond which the fatal event should not be ascribed to the prisoner's act; and the period selected by them was certainly so remote, that it would comprise the greater number of cases of murder. But no such justification can be urged in support of this principle in the present day. Medical science is now so far

¹ BLACKSTONE. Vol. IV. p. 197.

² ARCHBOLD. Crim. Pleading, 212. 1 HAWKINS, c. 23, s. 90.

advanced, that it is generally capable of pointing out to what degree the death of a deceased party is connected with the act of a prisoner, without reference to the period at which death may ensue. It is also generally capable of discovering and assigning their true value, to those circumstances which are known to accelerate or retard the fatal consequences of a wound.

Besides, it is obvious, that the law might as reasonably presume, that death is owing to some other cause, when a party dies at the *eleventh*, as well as when he dies at the *thirteenth* month after a wound. Indeed, upon similar grounds, there is no reason why all cases of murder should not be at once restricted to those instances, in which death follows within one calendar month from the time at which the injury is received. This would be pronounced a very absurd piece of legislation, but the rule appears to me to be the same in the two cases :—the cause of death being determined, not by the known pathological effects of a wound upon the system, but by the time which a party survives. It is true, that this principle of the common law may not often come into operation in the manner supposed ; but as long as it is medically certain that a man's death may be caused by and traced to a wound, received more than a twelvemonth previously (vide case, p. 420), so long is its continuance as part of the law of a country, unreasonable and impolitic.

The crime of manslaughter is known to vary considerably in its shades of guilt, sometimes approaching nearly to murder, at other times partaking of the character of homicide without felony. It would be impossible to specify these different shades, or to adjust a punishment to each, as the circumstances which aggravate or reduce the heinousness of

¹ This principle appears to be so far acted on in practice, that on every indictment for murder, it is necessary for the prosecutor to prove that the deceased died of the wound or wounds given by the defendant, *within a year and a day after he received them*.—ARCHBOLD. Crim. Pleading, p. 212. According to the same authority, an indictment would not be supported without this proof ; and if it were not afforded, a prisoner would be acquitted. Why should any other proof be required, than that the death of a wounded party was clearly traceable to the act of a prisoner?

the crime, are liable to constant variation. The discretionary power of punishing, given to the Court by the ninth section of the Lansdowne statute, fulfils all that can be desired for the ends of justice. A medical practitioner cannot be too deeply impressed with the importance of the fact, that in trials for manslaughter, his evidence will often serve to regulate the degree of punishment inflicted by the Court.

The eleventh section of the statute, refers to the *unlawfully and maliciously stabbing, cutting, or wounding*¹ *with intent to murder*; and the twelfth, to the same acts, *with intent to maim, disfigure, or disable, or to do some other grievous bodily harm*.

Medical evidence can have no reference to the unlawfulness of the act of a prisoner; but it may sometimes serve materially to establish the existence of a malicious intent, which is a necessary part of the legal proof. The situation, extent, and direction of a wound,—the importance of the parts of the body that it involves,—and the common consequences of such a wound on a healthy person, are circumstances, from which, as well as from the kind of weapon used by the prisoner, evidence of malice may be drawn. It is for the medical witness to state these points, and for the

¹ The medical jurist will perceive that the introduction into the Act of the words "stab or cut," before the word "wound," is perfectly unnecessary; since every stab or cut must be medically, and ought to be legally speaking, considered a wound. If it be said that the words have been introduced, in order to define the kind of personal injury more clearly, it would appear that the law is explicit where there is no occasion for its being so; while, as the reader will find hereafter, in regard to injuries resembling wounds, the words of the statute are neither sufficiently clear nor comprehensive. It will, however, be seen by the following quotation, that the words are not merely superfluous, but absolutely productive of mischievous effects. "An indictment for *cutting*, under the Ellenborough Act, was not supported by evidence of *stabbing*." *Rex v. M'Dermot*. Russ. and Ry. C. C. R. 336. CARRINGTON on the Criminal Law. p. 38. Doubtless the same decision would be made in a similar case under the Lansdowne statute: but if the words "stab or cut" were wholly expunged, and the word "wound" retained, no such legal informalities could occur:—that is to say, if the law would set any value on the medical signification of the word.

legal authorities to determine how far they are capable of giving rise to a presumption of malice against an accused party. If the wound were slight and unimportant, and the weapon used, incapable of causing a severe personal injury, these circumstances would probably alone do away with such a presumption, notwithstanding the existence of other facts against a prisoner. But, supposing that the maliciousness of the act is admitted and proved, we have next to inquire—

What is the legal definition of a Wound?—By the 43 Geo. III. c. 58, commonly called the Ellenborough statute, which was in force until within a comparatively recent period, the act of *stabbing* or *cutting* only, with intent, &c., was rendered a capital felony; so that whenever a wound could not be considered a cut or a stab, the prisoner was entitled to an acquittal if tried under this statute. Now it need hardly be observed, that the life of a person may be exposed to as much risk by a blow from a bruising instrument, as by the act of stabbing or cutting; yet, when the violence was of the former description, the prisoner escaped;—while if he had stabbed or cut the prosecutor, although the corporeal mischief might not have been so great in the latter case, he was liable to conviction for a capital felony. Professor Christian, the learned editor of Blackstone, gives the instance of a man, who was tried for cutting with intent to murder, under this statute. The prisoner clearly intended to murder a woman, his fellow-servant, and struck her over the face and head with the *sharp or claw part of a hammer*, until he thought she was dead: she recovered. He was found guilty; but his case was reserved for the opinion of the twelve judges. They held, that he was guilty of *cutting* within the meaning of the statute, and he was executed. But if, instead of using the claw, he had attempted to kill the deceased with the *blunt end of the hammer*, he would have been guilty of a misdemeanour only.¹

¹ BLACKSTONE. IV. 207.

In another case, which was tried under this statute, it appeared in evidence that the prisoner struck the prosecutor on the back of the head

This anomaly in our law, has been in some measure removed by the introduction of the word "wound," in addition to the terms "stab or cut"; but attempts are still not unfrequently made to restrict the meaning of this word, within limits totally inconsistent with the present advanced state of medical practice and opinion.

In the year 1831, three men were capitally indicted under the 9th Geo. IV. c. 31, s. 11, for having feloniously assaulted and wounded Sir R. H. Leigh, Bart., with intent to murder him.¹

The proceedings arose out of a contested election, in which the prosecutor took an active part. It appears, that during the election, he was seized by the mob, among whom were the prisoners, and was beaten and maltreated by them until he was apparently in a lifeless state. The medical witness deposed, that when called to the prosecutor, he found him lying on a bed greatly exhausted. There were several wounds on the head; the skin of the nose was pulled off, a rib on the left side broken, and there were two indentations, as if by kicking, on the shin-bone. Witness considered him in a state of danger for several days.

The counsel for the prisoners submitted, that the evidence of the surgeon did not prove such a description of wound as that which was contemplated by the statute. The words in the Act of Parliament were, "stab, cut, or wound;" therefore, it was clear that the word "wound" had reference to such description of wound, as was made by cutting or stabbing. The wounds in the present case, had been produced by a stick or a shoe, and therefore did not come within the statute. In answer to this, the judge observed, —the former Act of Parliament, commonly called Lord Ellenborough's Act, only contained the words "cut or stab,"

with a cavalry sword, which was at the time in a steel scabbard, and lacerated the skin of the head, causing it to bleed considerably: Bayley, J. held that it was not a case within the statute. *R. v. Whitfield*, Salop Summ. Ass. 1822. In short, an *incised* wound was always required to be proved: a mere *contused* or *lacerated* wound was not within the Act. ARCHBOLD, Crim. Plead. p. 246.

¹ Lancaster Aut. Circ. August, 1831: before Mr. Baron Vaughan.

and, therefore, had been held only to comprehend that class of wounds which were made by a sharp instrument. Great inconvenience had resulted in consequence; and on the revision of the criminal law, in the ninth year of the late king, the word "wound" had been introduced into the new Act by Lord Lansdowne, for the express purpose of remedying the defect of the former Act, and of providing for the infliction of wounds by blunt instruments. He (the judge) had had an early occasion to consider the operation of this Act, while sitting under the late special commission. A man of the name of Withers had been indicted and found guilty of inflicting a grievous wound, with intent to kill, by throwing at the prosecutor a blacksmith's hammer. There was some doubt whether this would come within the meaning of the Lansdowne statute, and the point was reserved for the consideration of the twelve judges. They all concurred in thinking that the case was within the Act. The same point had been likewise determined in a case reserved from the last York Spring Assizes, where the question was,—whether a blow from a clog or shoe, was within the Act. The objection now made, could not therefore be sustained. The jury acquitted the prisoners.

From the statement of the learned judge on this trial, injuries inflicted by blunt instruments may now be regarded as *wounds* in a *legal* sense. The omission in the Ellenborough statute, affords a strong proof that the amalgamation of medicine with jurisprudence in this country, had gone on but slowly. Indeed there are, even now, some parts of our criminal law, the provisions of which are directly opposed to the sound principles of medical science; and which, although rarely enforced, still, as the relics of barbarous and unenlightened times, ought to be entirely abolished.¹

Can a wound, within the meaning of the Lansdowne

¹ Let the reader refer to the 13th section of the Lansdowne statute, which will be more fully examined hereafter, in which the punishment for criminal abortion is regulated by the period at which a woman quickens, the law resting upon that absurd presumption of our forefathers, that the child is not living until after the period of quickening!

statute, be produced without a weapon? There is no doubt that a strong athletic man may, by striking another with his fist, produce an injury far more serious than many wounds inflicted by cutting, stabbing or blunt instruments. The ribs or jaw may be fractured, the bones of the face may be broken,—in other words, “grievous bodily harm” may be done by a powerful blow. The intention of the prisoner, if not actually to commit murder, might be to disfigure or disable the prosecutor; and in this, a strong man would as effectually succeed with his fist, as if a weaker man had used what the law would deem a weapon. But, while the latter renders himself liable to conviction under the Act, it is doubtful whether the former would, although the injury may have been of a far more serious nature. The term weapon is not mentioned in any part of the statute, but it is left uncertain, whether the word “wound” would be considered applicable in law, to a blow inflicted by the fist.¹ It does not appear to have been contemplated by our legislature that serious violence might in this manner be done to a party, or the words of the statute would probably have been more explicit. Medically speaking, a wound, capable of disfiguring, disabling, or of doing “grievous bodily harm,” may be given by the fist, as easily as by the use of a blunt instrument; and undoubtedly, the medical jurist would call the result a wound, without any reference to the means by which it was produced. As, in the case of murder or manslaughter, whether the prisoner killed the deceased by a blow of his fist, or by a bludgeon, would make no difference in his legal guilt,—so it ought to follow that in these minor offences against the person, the means used to produce the injuries, should be disregarded, provided their effects were equally serious, and they were inflicted with criminal intent. This part of the statute has not yet been tested, and it is a question for a lawyer only to con-

¹ ARCHBOLD in treating of the evidence required to support an indictment for a common assault, observes, that “A *wounding* is where the violence is so great as to draw blood by striking or stabbing with a sword, knife or other instrument; or by shooting or striking with a cudgel, *fist* or the like.” *Criminal Pleading*, 241.

sider, whether an indictment would ever be laid, or if laid, sustained, under either section of the act, so long as the words "stab, cut, or wound," stand without any other explanation than that which may be arbitrarily attached to them.

The reader will judge, from the following case, of the view taken by our legal authorities of the meaning of these words in the statute.¹

Thomas Hough, a powerful-looking man, was indicted for having assaulted, cut and maimed, John Lawson, with intent to murder him.

The evidence of the prosecutor, his wife and another witness, went to shew, that the prisoner had quarrelled with the prosecutor, concerning some money which the former owed the latter. This quarrel took place at a public-house. The prosecutor and his wife returned home; when late in the evening, a loud knocking was heard at the door, and on its being opened by the wife, the prisoner rushed violently in, striking her with his left arm, which being a *stump*, had a *shaft of wood with an iron ring attached to it*. The prosecutor then came to the assistance of his wife, when the prisoner immediately attacked him, beating him with the same shaft, breaking four of his teeth and cutting his nose and lips. The prisoner was, at the time, a little intoxicated, but the prosecutor gave him no provocation.

The medical witness, who was called, described the personal injuries, and said that they were not dangerous,—they seemed to have been inflicted by the wooden shaft and ring of iron, which certainly might produce such wounds as would do "grievous bodily harm." *The stump, without the shaft, could not have inflicted such wounds.*

The prisoner alleged that he had struck the blows in self-defence, and that he had used the shaft owing to the misfortune of his not having a hand. His counsel then took an objection, that by the 12th section of the 9 Geo. IV. cap. 31, under which the indictment was drawn, it must be intended that the wounds there described, should be inflicted

¹ Midland Circ. Nottingham, March 1832: before Mr. Baron Bayley.

by some weapon; and the wooden hand which the prisoner had to supply the want of his natural hand, having, by his misfortune, become *part as it were of himself*, could not be taken to be a *weapon*, such as the Act of Parliament contemplated.

Mr. Baron Bayley over-ruled the objection, and cited a case in which the jury found, that wounds were inflicted by the heel of a man's shoe, in kicking; and the judges having deliberated upon it, decided that a man's shoe was *such a weapon as would inflict the wounds contemplated by the statute*. The prisoner was found guilty.

What would have been the result of the case, if the prisoner had inflicted the injuries with his fist instead of a wooden shaft? From the view taken by the counsel and the learned judge, of the meaning of the statute, a weapon, *i. e.* something extraneous to the body itself, is required to produce a wound within the Act. A man's shoe has been decided to be a weapon; and probably, by a species of legal refinement, a glove on the hand might be so considered;—but because a severe injury is inflicted by a heel or a hand uncovered by a shoe or a glove, is it, medico-legally speaking, the less a wound? To treat this subject seriously,—the real meaning of the word “wound” in law, should be at once fairly settled, or, otherwise, as I shall have presently occasion to shew, there must be cases in which acquittals will take place through the loose and undefined expressions adopted in the statute. Is it to be allowed that a blow from a bruising instrument is a wound within the Act, while a severe blow from the fist or by stamping on the body with the naked foot, is not?—although the bodily harm may be far more serious in the latter, than in the former case. If a rib is broken, a jaw fractured, or an arm dislocated by a bludgeon, are we to consider the injuries more serious, and as requiring heavier punishment, than when they result from *manual violence* wilfully and maliciously inflicted? This surely cannot be the meaning of our legislators. But it may be said, these injuries would not even be called wounds in a surgical sense;—this is unquestionably true; few

surgeons probably would call a simple fracture or dislocation, a wound ; or would they admit that a blow from a blunt instrument was a wound, unless the integuments were torn. A "wound" is defined in surgery, to be "a recent solution of continuity in the soft parts, suddenly occasioned by external causes." This definition is vague, because it would apply to a rupture of the liver by a blow on the abdominal parietes, which could scarcely have been intended ; it also applies to burns, and to the corrosion of the integuments by powerful mineral acids, which again would not perhaps commonly be set down as wounds in surgery.¹ There are two ways of removing this difficulty :—I. Either by giving a full and comprehensive meaning to the word "wound," in legal medicine, so that it may take in injuries produced by *external causes* of whatever nature, and affecting either the surface or interior of the body ;—such as dislocations, fractures, burns, whether from the use of red hot weapons, of melted metals, boiling liquids, or, according to the common acceptation of the term, of any of the concentrated mineral acids or alkalies : or, II. Since any of these causes may as seriously injure the person, as stabs or cuts, and may maim, disfigure, disable or give rise to more grievous bodily harm than stabs or cuts, in the event of the injured party escaping with life,—some term should be invented to supply the place of the word wound, if it is to be used in law in the restricted sense in which it is often employed in surgery.

In order to shew that these objections to the words of the statute, are not raised upon mere hypothesis, I beg to call the reader's attention to the following case, tried before C. J. Tindal, at Liverpool, so recently as August 1835.

Ann Murrow was indicted under the Lansdowne statute,

¹ Since writing the above, I have been kindly favoured with the following definitions of a wound, from three surgeons of this metropolis, who occupy the first rank in their profession.

"A solution of continuity from violence of any naturally continuous parts."

"An external breach of continuity directly occasioned by violence."

"An injury to an organic texture, by mechanical or other violence."

for having thrown a quantity of vitriol upon the face of J. Wade, with intent to disfigure, or to do him some grievous bodily harm. The evidence went to shew, that the prisoner had been a servant in the prosecutor's family, some time previously, and had been discharged from his service for misconduct. On the day on which the offence was committed, the prisoner met the prosecutor in the street and demanded charity of him. He turned round to give her something, when she immediately threw a quantity of vitriol in his face. His sight was destroyed, and the skin of his face came off in blisters, leaving ulcerated surfaces. Two medical witnesses were summoned to give evidence. One said that the injury, caused by the action of the vitriol on the face, was *not* what he should call a *wound*. The other witness said that, in his opinion, the vitriol had produced what he should consider to be a *wound*. The clothes worn by the deceased, were much destroyed by the action of the acid. The prisoner confessed her crime. The jury returned a verdict of guilty, but the judge reserved it for the opinion of the twelve judges, whether the injury would come within the meaning of the word "*wound*" in the Act.

After due deliberation, the judges in consultation decided, that the injury inflicted on the prosecutor, did not constitute a "*wound*" within the meaning of the twelfth section of the statute. The prisoner was thereby acquitted of felony, but she still remains to be tried for a misdemeanour.¹

There can scarcely be a doubt of the necessity for an explanation or alteration of the words in the statute, after the perusal of the above case; and it is not a little singular, that there should have been a clause introduced for the express purpose of avoiding a legal doubt on this subject in the Ellenborough Act as extended to Scotland, which took place at the suggestion of the Lord Advocate; while, although the crime has been of late years not unfrequent in England, no such provision has been hitherto made to

¹ It will be seen by what immediately follows, from the decision of the judges in this case, that an offence which amounts to a *capital felony* in Scotland, constitutes only a *misdemeanour* in England!

ensure punishment to the perpetrators. The insufficiency of the Act for the prosecution of offenders, is rendered obvious, by the necessity which the Lord Advocate felt of introducing a distinct clause into the former statute, wherein the word "wound" has been throughout carefully omitted. It runs thus :—

"If any person shall wilfully, maliciously and unlawfully throw at, or otherwise apply to any of his Majesty's subject or subjects, any sulphuric acid or other *corrosive substance*, calculated, by external application to burn or injure the human frame, with intent in so doing or by means thereof, to murder or maim or disfigure or disable, such his Majesty's subject or subjects, or with intent to do some other grievous bodily harm, to such his Majesty's subject or subjects: and where, in consequence of such acid or other *substance* being so wilfully, maliciously, and unlawfully thrown, or applied with intent as aforesaid, any of his Majesty's subjects shall be maimed, disfigured, or disabled, or receive other grievous bodily harm,—such person being thereof lawfully convicted, shall be held to be guilty of a capital crime, and shall receive sentence of death accordingly."

The reader will perceive that even if this clause were inserted in the English Act, it would not be sufficient; for the substance is required to be "*corrosive*," and a lawyer might have fair ground for questioning, whether a red hot iron, melted lead or boiling liquids, applied to the surface of the body, could be regarded as *corrosive substances* within the strict *legal meaning* of the clause; and yet such means are as capable of maiming, disfiguring, disabling or producing grievous bodily harm, as *sulphuric acid or other corrosive substances*.

These points are suggested as subjects for the consideration of lawyers; and at the same time for the purpose of showing that the criminal jurisprudence of a country, at

¹ The reason why this clause was added to the Ellenborough Act, as extended to Scotland, was, that the crime had been frequent in Glasgow, during the quarrels between masters and workmen concerning the rate of wages. CHRISTISON on Poisons, 115. A case was given at p. 336, in which a woman was condemned under this clause of the Ellenborough Act. Dr. Christison states what is really the fact, that the crime has lately become common in England. Five cases are mentioned by him, as having occurred in London and Manchester within a very short period.

least in questions relating to offences against the person, cannot be established on a secure foundation, as a means of repressing crime, without a reference to the principles of medical science.

The provisions of the Penal Code of France are, in these respects, far more clear than those of our own Statute Law. By Art. 309 and 311 of the French Code, punishment is adjudged to "*tout individu qui aura fait des blessures ou porté des coups.*" "The words *blessures, coups ou violences,*" observes Devergie, "are not defined by the law. These expressions are employed almost indifferently by the legislator,—sometimes separately, at others combined. They have, therefore, the same value in a legal sense, and comprehend all the possible effects produced upon the human body by external agency, whether the cause operate *mechanically* or *chemically* upon any part of the living system. A burn, in the eye of the law is a wound, (*une blessure,*) whether it result from the application of a heated body, or of a powerful mineral acid. However repugnant to the surgeon, it may appear to place these two descriptions of personal injury, in the same category as wounds, (*blessures,*) we are compelled to classify both under the same general denomination, in order that there may be no violation of the text of the law."

So, again, M. Brierre de Boismont says,—“By wounds (*blessures*) we understand, in Legal Medicine, every local effect on the body, produced by an act of violence, or by the application of any caustic or corrosive agent. Hence, under the head of wounds (*blessures*) are to be included bruises or contusions, fractures and dislocations,—sprains and burns comprehending scalds and sores.”

¹ DEVERGIE. Tom. II. p. 12. M. Devergie's *Médecine Légale*, which has just appeared, may be regarded as taking precedence of all other treatises in the French language,—in the comprehensiveness and practical application of its details. The juridical portion of the work has been revised by M. Dehaussy de Robécourt. Its utility to the English medical jurist is, of course, somewhat curtailed, by the difference which exists in the jurisprudence of the two countries.

² BRIERRE DE BOISMONT. *Manuel de Méd. Lég.* p. 105.

From these quotations, it will be seen that a criminal, in France, cannot escape the consequences of his act, for the reason that the lawyers and surgeons of that country have left the signification of the word "wound" unsettled. The French law strictly regards the *effect* produced on an injured party; and, whether a personal injury result from a blow of the fist, from a kick with the foot, from a bludgeon, from a cutting or stabbing instrument, from a burn or a scald,—the punishment is, as it undoubtedly ought to be, the same. This is regulated by the degree of mischief which results, and not by the *means* which the aggressor may select in order to produce it. The evil, as it exists in the English law, will probably only be remedied by degrees, at the expense to society of the escape of an atrocious offender, on each successive discovery of the insufficiency of the words in the present statute, to comprehend the possible varieties of crime. But this is not the only pernicious result of defective legislation,—punishment no longer bears a ratio to the offence; for a man who cuts or stabs another, within the meaning of the statute, is liable to be capitally convicted, although the personal injury produced may have been but trifling (vide Hough's case, p. 484); while another who employs sulphuric acid or boiling water, to disfigure and disable, may be acquitted, although the resulting personal injury be of the most severe description.¹ In the mean time there does not appear to be any remedy in the hands of medical witnesses; for even if they should agree unanimously to give the same enlarged signification to the word "wound" as their continental brethren, it does not follow that this interpretation would be adopted by those

¹ It is true that a party, if acquitted of felony under these circumstances, is liable to be tried for a misdemeanour; and, in the event of being found guilty, his punishment may, within certain limits, be rendered severe. But the question naturally suggests itself,—why so anomalous a principle should be tolerated in law, that what is felony in the case of one prisoner should be a misdemeanour in another;—although the same malicious intent may have existed, and the same degree of mischief have resulted from the acts of the two. The only difference in the two offences would be, that the injury was produced in the one case by *mechanical*, in the other by *chemical* means. Vide Murrow's case (p. 486.)

who have to decide on the legal meaning of the statute. But it is more than doubtful whether the members of the medical profession would be unanimous on the point (vide *Murrow's case*, p. 486); and, therefore, it is for our legislators either to alter the words of the statute, to suit all the forms of violence; or so to define the word "wound," as to place its legal signification above the arbitrary opinions of individuals.¹

MAYHEM OR MAIMING.

The wounding of another, is also considered by the law in the light of a *civil injury*, and is defined to be an aggravated species of battery. But *mayhem*, by the Common Law, is a still more atrocious injury than mere wounding, and consists in violently depriving another of the use of any member, proper for his defence in fight. *Mayhem*, in the Latin of the middle ages, was called *mahemium*, and was probably originally derived from the French, *mehaigner*. The distinction between mayhem and ordinary wounds, appears to have been first made by the Normans, in whose code it is early described.²

"Mayhem," says Blackstone, "is a battery attended with this aggravating circumstance, that thereby the party injured is for ever disabled from making so good a defence against future external injuries, as he otherwise might have done. Among these defensive members, are reckoned not only arms and legs, but a finger, an eye and a fore-tooth, and also some others. But the loss of one of the jaw-teeth,

¹ I shall leave it for the consideration of a lawyer, whether, if for the words "stab, cut or wound any person," in s. 11 of the statute, the following were substituted, "wound or produce any grievous bodily harm on any person, *by any means whatever*;" and if for the words "stab, cut or wound," in s. 12, the following were substituted, "wound or otherwise injure *by any means whatever*,"—the administration of the law would not be rendered more effective, by preventing the escape of many atrocious offenders, who must be acquitted of felony under the statute, as it at present stands.

² CRABB'S History of English Law, p. 298.

the ear, or the nose, is no mayhem at Common Law, as these parts can be of no use in fighting,—they do not weaken, but only disfigure the individual.”¹ Such is the legal definition of mayhem: the punishment adjudged, has varied greatly at different periods, and the changes in it form a very singular feature in the history of our law. In the first place, during the time of the Saxons, when the principle of compensation in money was adopted for every personal injury whatever, even to the taking away of life, a certain price was fixed for wounds according to the nature of the wound, or the member injured.² The cutting off an ear was to be compensated by the payment of twelve shillings; clipping it off, six shillings; and striking out an eye, fifty shillings. For a wound an inch long a shilling was to be paid, and for one of the same size in the face, two shillings. If a master beat out the eye, or the teeth of his slave, the latter recovered his freedom.³

“By the ancient law of England,” says Blackstone, “he that maimed any man, whereby he lost any part of his body,

¹ III, 121. IV. 206. By the 36th Henry VIII. c. 6, treble damages were given for the cutting off an ear, though this was no *mayhem* at Common Law.

One remarkable property is described, by Blackstone, as peculiar to the action for a mayhem; namely, that the Court in which the action is brought have a discretionary power to increase the damages, if they think the jury at the trial have not been sufficiently liberal to the plaintiff; but this must be done *super visum vulneris*, and upon proof that it is the same wound concerning which, evidence was given to the jury. 1 Wils, 5. 1 Barnes, 106. The medical jurist will perceive that this is a case in which his services may be required.

² If a man killed his chief guest, his death was to be compensated with eighty shillings, and that of his other guests according to their rank. By the laws of Athelstan, the life of every man, not excepting that of the king himself, was estimated at a certain price, which was called the *were* or *æstimatio capitis*. The were for the life of the king was 30,000 krynmas (about £300); that for a prince 15,000; for a bishop or alderman 8,000; for a sheriff 4,000; for a thane or priest 2,000; and that for a ceorl 260. CRABB. p. 36.

³ CRABB. loc. cit. Money was of considerably greater value in those days than at present.

was sentenced to lose the like part, *membrum pro membro*.¹ But this went afterwards out of use, because the law of retaliation is at best an inadequate rule of punishment ; and also because, on a repetition of the offence, the punishment could not be repeated. So that by the common law, as it for a long time stood, *mayhem* was only punishable by fine and imprisonment, unless, perhaps, the offence of mayhem by castration, which all our old writers held to be felony : *et sequitur aliquando pœna capitalis, aliquando perpetuum exilium, cum omnium bonorum ademptione*." Castration was adjudged to be mayhem, though committed upon the highest provocation,—as by a husband upon the adulterer with his wife.²

Subsequent statutes, continues this excellent writer, have put the crime and punishment of mayhem more out of doubt. For first, by statute 5 Henry IV. c. 5, to remedy a mischief that then prevailed of beating, wounding, or robbing a man, and then cutting out his *tongue*, or putting out his *eyes*, to prevent him from being an evidence against the aggressor ; this offence was declared to be felony if done of malice prepense ; that is, as Sir E. Coke explains it, voluntarily and of set purpose, though done upon a sudden occasion. Next in order of time, is the 37 Henry VIII. c. 6, awarding treble damages for the cutting off the ear. Then came that of 22 and 23 Car. II. c. 1, called the Coventry Act. By this statute it was enacted, that if any person shall, of malice aforethought, unlawfully cut out or disable the tongue, put out an eye, slit the nose, cut off a nose or lip, or cut off or disable any limb, or member of any other person, with intent to maim or disfigure him, such person,

¹ BLACKSTONE. IV. p. 206. 3 Inst. 118. Mes si la pleynte soit faite de femme, qu'avera tolle a home ses membres, en tiel case, perdra le feme la une meyn par jugement, come le membre dount elle avera trespasse. BRIT. c. 25.

² SIR EDWARD COKE (3 Inst. 62) has transcribed a record of Henry the Third's time, by which a gentleman of Somersetshire, and his wife, appear to have been apprehended and committed to prison, being indicted for dealing thus with John the Monk, who was caught in adultery with the wife.

his counsellors, aiders and abettors, shall be guilty of felony, without benefit of clergy. While this statute was in force, many trials took place, in which the meaning of the words "slitting the nose" gave rise to considerable discussion, in respect of what the law intended by a slit.¹ To this statute succeeded that of the 43 Geo. III. c. 58, in which the words, stab or cut, alone were employed; and lastly, we have the Lansdowne statute repealing all the preceding, excepting the 37 Hen. VIII. c. 6, which, it will be observed, did not refer to the felony of mayhem.

The punishment of maiming in England as a crime, now, therefore, rests chiefly on the 9 Geo. IV. c. 31, s. 12; but what is maiming in law, is not therein specified. Probably medical evidence would be required to settle this point; for the definition of mayhem at common law, is totally unsuited to the present acceptance of the term. A wound or incision in the throat has been held not to be a maiming;² nor can we imagine, that in the present day, the striking out an eye or a fore-tooth, would sustain a charge of mayhem. Our ancestors made a distinction between the loss of the fore-teeth and back-teeth, the loss of the latter not constituting, in their view, a mayhem; but as the teeth are not now used for fighting, so we may suppose the principle would no longer be applicable. Maiming, medically speaking, is at present, chiefly restricted, and ought to be exclusively confined, to the loss of a part or the whole of a limb. Would castration, by which term the medical jurist ought not only to understand the removal of either or both testicles, but also of the penis itself—be regarded as a maiming in law? Castration appears to be no longer a specific crime in the English law;—it is fully comprehended in the twelfth section of the statute; for if the wilful removal of the penis

¹ BLACKSTONE. IV. 207.

² Ibid.

³ Castration, according to the law of France, is the removal of any organ necessary to generation; therefore the amputation of the penis will constitute one form of the crime (*Arrêt du 1er Sept. 1814*). This is the most rational signification to attach to the term; for the nomenclature, adopted by surgeons, often requires extension, in order to adapt it to the purposes of legal medicine. Vide DEVERGIE. Tome II. p. 9.

or testicle, could not be said to be a wound capable of maiming, disfiguring or disabling, it must at least constitute such a wound as would produce "grievous bodily harm."

In concluding these remarks upon the criminal legislation of our country, regarding wounds, there is another part of the Lansdowne statute which requires attention. I allude to the very singular manner in which the punishment for the wilful intent to maim, disfigure, disable &c., is regulated by the twelfth section. The circumstances under which the offence is committed, must be such as would have constituted *murder* in law if death had ensued; so that, when the crime would have amounted to *manslaughter* if the party had died, and not to murder,—however "grievous" the "bodily harm" may have been,—however the individual may have become, by the act of an aggressor, maimed, disfigured, or disabled, even for life, still the offender must be acquitted. An intelligent barrister, who has devoted considerable attention to the criminal jurisprudence of our country, observes most truly, in summing up his remarks upon the subject, that *under this amended law, the party who attempts or perpetrates a grievous bodily injury to another, must either lose his life, or suffer no punishment whatever!*¹

One or two cases will set this matter in a clear light.

John Panyer was indicted under the twelfth section of the Act, for having shot at and severely wounded John Rout, at Crundall.²

The prosecutor deposed, that he was an out-pensioner of Chelsea hospital, and was travelling on foot, with his wife, from Wye to Canterbury. They met the prisoner at Tramworth, where they stopped to refresh themselves. The prisoner, who was armed with a gun, began to abuse the prosecutor and his wife; and, after having given the prosecutor repeated provocations to fight, he pointed his gun

¹ Cutting the female organs of generation, so as to enlarge them for a time, may be considered as producing "grievous bodily harm," and done with that intent, although the hymen be not injured, and the wound eventually not dangerous. *R. v. Cox. Russ. and Ry. C. C. R. 362. CARRINGTON'S Criminal Law. p. 210.*

² Tracts on the Punishment of Death. No. 4.

³ Maidstone Spring Circ. 1831: before Lord Lyndhurst.

at him. The prosecutor, thinking that his life was in danger, struck the prisoner with a stick on the arm, in order to make him drop the gun. The prisoner instantly fired, and the contents of the gun lodged in the prosecutor's thigh. The wound thereby produced, was of so severe a nature, that he was confined many weeks in consequence of it ; and had not, up to that period, recovered from its effects.

His lordship here observed, that, as the gun was discharged after the prisoner had been struck by the prosecutor, even if it had caused death, the offence in law would not have amounted to murder, but only to manslaughter, the prisoner must therefore be acquitted. It was unfortunate, that as the statute was framed, *the act of which the prisoner had been guilty, was either a capital crime, or no crime at all!*

William Burrows was charged under the Lansdowne statute, with having cut and stabbed Thomas Price, with intent, &c.'

The prosecutor and the prisoner had had a quarrel about two years before the present attack. On the day laid in the indictment, the prisoner purposely placed himself in the way of the prosecutor, and after having abused him in language, struck him. The prosecutor returned the blows in self-defence ; the prisoner closed with him, and, with a knife which, it is presumed, he must have had concealed in his hand, he stabbed the prosecutor repeatedly on the temple and neck. The cravat of the prosecutor, which was cut through in several places, prevented any serious wounds from being inflicted on the neck ; but some of those on the temple were three inches in length. By one of them, the main trunk of the temporal artery had become divided, and the prosecutor lost a considerable quantity of blood.

The case fell to the ground, because the prosecutor admitted, that a great many blows had passed between them, and that he had struck the prisoner in self-defence. Mr. Justice Taunton observed, that if death had ensued, it would have been only a case of manslaughter : the prisoner must be acquitted.

Oxford Spring Circ. 1832 : before Mr. Justice Taunton.

Let us suppose that a man, in a slight quarrel with another, maliciously maims his antagonist, by cutting off or dislocating a member or part of a member;—or that he disfigures him and destroys his sight by violence, or by throwing a mineral acid over his face, or in any way disables him,—is it consistent with the course of justice that the aggressor should be wholly acquitted of felony? In regard to murder and manslaughter, each has a prescribed punishment; in the latter case, this is very properly made to vary, according to the degree of accompanying atrocity, and a discretionary power of punishing is vested in the Court. But if a man be punished as a felon for the intent to commit one crime (murder),—why is he to be acquitted of felony when he fails to perpetrate another (manslaughter); because, through accidental circumstances, in which he is in no way concerned, the wounded party does not fall a victim to his violence, although he may suffer from it for life? The crime of manslaughter borders sometimes closely upon murder; yet, although the highest punishment fixed by law for this offence, might be inflicted on a prisoner for his act, supposing his victim to die, he is, under this statute, exonerated from any of the consequences of that act, if the wounded party should recover. Thus it will be seen, that so far as the Lansdowne Act is concerned, the slightest injury to the person, and the most severe and disabling wound, are placed upon the same level; when, under the infliction of either, in the event of the death of a party, the case would have amounted to manslaughter. If manslaughter were always a light offence, and always the same description of offence, the provision of the law might admit of a justification; but when it is considered, that this crime is sometimes of a very heinous, and at others, of a venial nature, then its injustice becomes manifest; because the prisoner is acquitted, on this statute, without any reference to the shades which, in the event of death from his act, the manslaughter might have assumed. It must also be obvious, that the punishment of death will be, in some instances, far too severe for offences falling under the first clause of the twelfth section (vide Lawson's case); for

sometimes the maiming or disfiguring may be comparatively slight, and yet, in the strictness of law, an individual may be capitally convicted.

It would be difficult, perhaps, to propose a remedy, entirely free from objection, for the defects which our great law-authorities acknowledge to exist in this statute; but that its provisions ought to be changed, is undoubted, the more especially when it is considered, that of all parts of our criminal law, its defective sections are perhaps the most frequently brought into operation.¹

The French law, relating to these offences against the person, although not perfectly unobjectionable, appears to be, in some respects, better than our own.

Wounds, *criminally* inflicted, assume, according to the French penal code, three gradations. The term "wound," as has been already observed, is applied in law, to all personal injuries produced by whatever external cause, and an aggressor is held responsible for his crime—I. according to the *intent*,—and II. according to the *result* of his violence.² The first class is,—where a wound produces bodily incapacity "*incapacité de travail personnel*"³ for a period less

¹ From an average of six years subsequent to the passing of the Act, the committals annually, under the eleventh and twelfth sections, have amounted to 136.

² There is a third point, which is to a certain extent peculiar to the French code, namely, that the rank of a person injured creates a difference in the offence. Vide Art. 223. 228. 230. 231. 232. 302. 312. Code Pénal. It is an aggravation of the offence, and there is a corresponding increase of punishment, if the wounds are inflicted on a parent, a magistrate, or a person armed with public authority.

³ According to M. Devergie, by the words *incapacité de travail*,—"ce n'est pas l'incapacité de travail *personnel*, mais bien l'incapacité de travail *corporel*. Ainsi l'incapacité de travail doit être jugée par le médecin, en ce sens qu'il s'agit de la détermination du temps nécessaire pour faire rentrer la partie malade dans les conditions de l'état de santé, et sans avoir égard à la profession de l'individu blessé." DEVERGIE. Méd. Lég. T. II. p. 6. A case is related, in which it was decided, that from the want of power to use an arm for more than twenty days after the receipt of a wound, it did not necessarily follow that the individual was incapacitated for all personal labour for a period of more than twenty days, within the meaning of the law.

than twenty days : the second,—where the incapacity is for more than twenty days : and the third class is,—where the wound is followed by death ; in which case, as in our own law, the crime is aggravated on proof of pre-existing malice. The two first classes, within which wounds unlawfully inflicted, are thus arranged, will comprise those cases that are dismissed under the twelfth section of the Lansdowne statute, on the ground that in the event of death, the crime would not constitute murder. The French law does not look to what the offence would amount to, on the presumption of a result which does not take place ; but it punishes according to the malicious intent of an aggressor, and the degree of mischief done. So far it must be regarded as superior in principle, to our own statute law ; but serious objections have been made to the assumption of an arbitrary standard of time, like that which separates the two first classes of wounds. In the first class, namely, where the “*incapacité de travail*” is for less than twenty days, the punishment may be only a month’s imprisonment ; while, if the “*incapacité*” extend beyond the twenty days, an aggressor is liable to five years solitary confinement.¹ Is it just that a single day should make so great a difference in the possible punishment, as the law would hereby imply ? The French jurists answer this objection by saying, that Art. 463 of the Code provides for all such extreme cases ; since, according to the proof of extenuating circumstances laid before a jury, the Court has the power of reducing the punishment of five years solitary confinement to only six days imprisonment, if it so think fit. However disposed I may be to consider the French legislation regarding wounds, preferable to our own, I do not think that the objection is satisfactorily removed by this explanation. A man puts out an eye, or cuts off an ear,—how is the “*incapacité de travail*” to be estimated in either of these cases ?—while *no greater degree of violence*, applied to the foot or hand, although attended with less serious after-consequences to the individual, might lead to an “*incapacité*”

¹ DEVERGIE. Loc. Cit.

of more than twenty days. The application of a heated weapon, or of a small quantity of sulphuric acid to the face, would disfigure and destroy vision, but the individual might not be incapacitated for twenty days:—the same application to the foot, would produce an injury, the effects of which might be of longer duration; while, if to the hand, the result might be, that the individual would be disabled in that useful member for life. Now, unless the importance of the parts of the body injured is, at the same time, regarded, it is obvious that the mere “*incapacité de travail*,” in a wounded party, can be no equable criterion for regulating the punishment inflicted on an aggressor. In the instance where a child, or a person in a state of infirmity or disease, and, therefore, of corporeal incapacity, receives a wound,—how can the “*incapacité de travail*,” required by the law to determine the punishment, be estimated, except upon presumptions which cannot always be safely admissible? M. Devergie says, that the physician is to understand by these words, the time necessary for the healing of a wounded part. But this is departing widely from the literal signification of the words; and it appears to be placing on them a constrained interpretation, to suit cases which were not contemplated in the framing of the Code. From this statement of the provisions of the law of France, if I have rightly apprehended them, it will be seen that the duties of a medical jurist of that country, in respect to the medico-legal examination of wounds unlawfully inflicted, are of a more arduous and at the same time, of a more responsible character, than those which fall to the lot of an English practitioner.

There is one other peculiarity in the French law, which has been already adverted to, (p. 305) but which may here claim a little further notice. It is that in which the offence of an aggressor is aggravated by the death of a party, within a fixed period after the receipt of a wound. The crime of castration, if followed by death within *forty* days, exposes the aggressor to capital punishment—Code Pénal, Art. 316.¹

¹ DEVERGIE, Vol. II. p. 5. Vide ante, p. 305.

So again, wounds inflicted on a public functionary, if followed by death, within *forty* days, render the aggressor liable to a much more severe punishment, than under other circumstances—Code Pénal, Art. 231. Such legislation appears not only contrary to all the maxims of justice, but decidedly mischievous in its tendency. Why are the guilt and punishment greater when death takes place within the prescribed periods? The principle of punishment ought surely to be regulated by the fact of a wound having clearly *caused death*, at whatever period that event may follow.

APPENDIX.

Form of an indictment for murder, by stabbing, with the evidence required to sustain it.¹

Middlesex to wit:—The jurors for our Lord the King, upon their oath, present that J. S., late of the parish of B., in the county of M., labourer, not having the fear of God before his eyes, but being moved and seduced by the instigation of the devil, on the third day of May, in the fifth year of the reign of our sovereign lord, George the Fourth, with force and arms, at the parish aforesaid, in the county aforesaid, in and upon one J. N., in the peace of God and our said lord the King then and there being, feloniously, wilfully, and of his malice aforethought, did make an assault; and that the said J. S., with a certain knife, of the value of sixpence, which he the said J. S. in his right hand then and there had and held, the said J. N., in and upon the left side of the belly, between the short ribs of him the said J. N., then and there feloniously, wilfully, and of his malice aforethought, did strike and thrust, giving to the said J. N. then and there, with the knife aforesaid, in and upon the said left side of the belly, between the short ribs of him the said J. N., one mortal wound, of the breadth of three inches, and of the depth of six inches; of which said mortal wound the said J. N., from the said third day of May, in the year aforesaid, until the fifteenth day of the same month of May, in the year aforesaid, at the parish aforesaid, in the county aforesaid, did languish, and languishing did live; on which said fifteenth day of May, in the year aforesaid, the said J. N. at the parish aforesaid, in the county aforesaid, of the said mortal wound died; and so the jurors aforesaid, upon their oath aforesaid, do say that the said J. S., the said J. N., in manner and form aforesaid, feloniously, wilfully, and of his malice aforethought, did kill and murder; against the peace of our lord the King, his crown and dignity.

Evidence for the Prosecution.

In and upon one J. N. It must be proved that J. N., was the person

¹ ARCHBOLD'S Criminal Pleading, p. 209.

During the year 1834, the number of murders were, in England and Wales 86, in Scotland 12, in Ireland 363.

killed: otherwise the defendant must be acquitted. If the name of the deceased be unknown, it should be so stated in the indictment.

With a certain knife. It is not necessary to prove this strictly as laid: for if death have been caused by any instrument capable of producing the same kind of death as the instrument stated in the indictment, the variance will not be material (vide p. 474). So if an indictment allege death by one kind of poison, proof of death by another kind of poison will support it.

The value of the instrument is immaterial. It seems to be stated in the indictment, because the instrument is forfeited as a deodand to the King; and the township is liable for the value of it, if it be not forthcoming.

In his right hand. It is necessary to allege in the indictment, in which hand the defendant held the weapon; but it is not necessary to prove it.

In and upon the right side. The indictment must show, with certainty, in what part of the body the deceased was wounded; and therefore if it allege the wound to have been on the arm, hand, or side, without saying whether the right or the left, it is bad. In this, and in other instances, there is a particularity required in an indictment for murder, that it would be ridiculous to attempt to account for or justify; for the same strictness is not required as to the evidence necessary to support it; if, for instance, the wound be stated to be on the left side, and proved to be on the right, or alleged to be on one part of the body, and proved to be on another, the variance is immaterial.

Of his malice aforethought. The law presumes every homicide to be murder until the contrary appears. Therefore the prosecutor is not bound to prove malice or any facts or circumstances besides the homicide, from which the jury may presume it; and it is for the defendant to give in evidence, such facts and circumstances as may prove the homicide to be justifiable or excusable, or that at most it amounted to but manslaughter.

Did strike and thrust. In all cases where the death is caused by personal violence, it is essential to the indictment to allege that the defendant struck the deceased: and it must also be proved. But it is not necessary to prove that he struck him with the instrument mentioned in

the indictment: proof of a striking which produced contused wounds only, would maintain it.

In cases of express malice, the homicide is usually committed in secret, and it is rarely practicable to substantiate it by direct and positive testimony; in most cases, the defendant is convicted upon circumstantial evidence merely (vide p. 366). In cases of implied malice, the homicide is usually committed in the presence of others, who may prove it; if not, it must be proved by circumstantial evidence.

One mortal wound of the breadth. The length and breadth of a wound must be shewn in all cases where it is possible to do so; but not where it is alleged that a limb was cut off, or that the wound was a contused wound merely. But even where necessary to be stated, it need not be proved as laid; evidence of another species of wound, in another part of the body, if the party died of it, is sufficient to maintain the indictment.

Of which said mortal wound. The dates here stated in the indictment need not be proved as laid. All that is necessary to be proved to support this part of the indictment, is that the deceased died of the wound or wounds given him by the defendant within a year and a day after he received them; for if he died after that time, the law would presume that his death had proceeded from some other cause than the wound. (vide p. 477.)

If a man be wounded, and the wound turn to a gangrene or fever, for want of proper applications, or from neglect, and the man die of the gangrene or fever: this is a homicide, and murder or not, according to the circumstances under which the wound was given. But if it appeared that the man's death was caused by improper applications to the wound, and not by the wound itself, it would be otherwise. (vide p. 319, et seq.)

The evidence required to support an indictment for murder, by drowning, by strangling, or by starving, is the same as that above given: the form of the indictment varies according to the kind of death.

Indictment for Manslaughter.¹

The evidence required to support an indictment for manslaughter, is the same as that for murder, with this exception, that in murder the prosecutor

During the year 1834, the number of manslaughters were, in England and Wales 228, in Scotland 29, in Ireland 210.

need only prove the homicide, without going into evidence of the circumstances under which it was committed; in manslaughter he must give evidence of all the facts of the case, so as to prove the homicide to be manslaughter. The form of the indictment in ordinary cases is the same as an indictment for murder, omitting the words "*of his malice aforethought*" throughout, and the word "*murder*" in the latter part of it.¹

¹ ARCHBOLD. Op. cit. p. 237.

INDEX.

- ABDOMEN**, wounds of the, 461, 466.
- Abscess**, death from the rupture of an, 317; in the brain, questions relative to, 419.
- Acid**, Carbonic, mistakes respecting suffocation by, 197; symptoms and appearances produced in poisoning by, 199; supposed action of on the blood, 201; its presence how determined, 206; combustion supported by a poisonous mixture of, 207.
- Acids**, mineral, are wounds produced by the, 486.
- Adipocere**, formation of, 89, 156.
- Age**, influence of, on the process of putrefaction, 89.
- Air**, effects of exposure to, on the bodies of the drowned, 111; suffocation from confined, 205.
- Amos**, Mr. case of manslaughter reported by, 410.
- Ansiaux**, M. case by, of suicidal hanging, 178.
- Apoplexy**, the supposed cause of death in hanging, 160.
- Arnott**, Dr. his remarks on the buoyancy of the human body, 153.
- Arsenic**, antiseptic properties of, 92.
- Asphyxia**, 31; causes and symptoms of, 32; changes undergone by the blood in, 37; conclusions respecting, 48; action of venous blood on the muscular and nervous systems, 52; from drowning, 103; from hanging, 165.
- Aubert**, M. on the spontaneous combustion of charcoal, 261.
- Bacon**, Lord, case by, of resuscitation from hanging, 164.
- Bally**, M. case by, relative to human combustion, 258.
- Barber**, Ann, trial of, for poisoning, 21.
- Barristers**, their neglect of Medical Jurisprudence, 19; cross-examinations of medical witnesses by, 405.
- Bayley**, trial of, for murder, by drowning, 147.
- Béclard**, observations by, on cadaverous irritability and rigidity, 69.
- Beddingfield**, murder of, by strangulation, 192.
- Bell**, Sir C. case by, 406.
- Berger**, M. experiments by, on air expired in asphyxia, 38.
- Bichat**, his theory of asphyxia, 33, 47.
- Biessy**, M. case by, 323.
- Black-hole** of Calcutta, 205.
- Bladder**, ruptures of the, 466.
- Blood**, changes of the, in asphyxia, 39; state of the, in the drowned, 113; in those killed by lightning, 225; evidence from the state of the, in fatal wounds, 280; spots of, on linen and weapons, 376; tests for the identification of, 382; supposed distinction between human and animal, 385.
- Body**, time at which it is destroyed by putrefaction, 96.
- Bond**, trial of, 464.
- Bones**, changes in the, in drowned subjects, 158.
- Bourbon**, Duke of, evidence respecting the supposed murder of, 180.
- Bourgeois**, M. case of resuscitation from drowning by, 105.
- Brain**, congestion of the, in drowning, 114; wounds of the, 421; abscess in the, 419.
- Brodie**, Sir B. his opinions respecting the cause of death in hanging, 161.
- Bruhier**, M. observations by, on apparent death, 63.
- Buoyancy** of the living and dead body in water, 152.
- Burke**, trial of, for murder, 288.
- Burns**, not a direct effect of lightning, 223; death from, 248; appearances assumed by during life, and after death, 251.
- Burrows**, trial of, 496.
- Carotid arteries**, wounds of the, 435; possibility of voluntary locomotion after wounds of the, 439, 443.
- Carraccioli**, Admiral, case of, 154.
- Carwardine**, Walter, trial for the murder of, by drowning, 135.
- Castration**, 493.
- Chalk**, case of, 309.

- Châteauneuf-les-Moustiers, accident at, from lightning, 227.
- Cholera, coldness of the body in, and increase of temperature after death from, 76; supposed premature interments in cases of, 98.
- Cheselden, Mr. evidence of, on a trial for murder, 418.
- Christison, Dr. experiments and observations by, on the effects of burns, 251.
- Circulation, pulmonary, in asphyxia, 42.
- Circumstantial evidence in wounds, 366.
- Civille, François de, burial and resuscitation of, 64.
- Clench, Dr. murder of, by strangulation, 195.
- Coal, fatal cases of the respiration of the vapour of, 203.
- Coal-gas, poisoning by, 213.
- Code Pénal of France, provisions of the, regarding wounds, 498.
- Cold, effects of, on the body, 233; accelerated by exhaustion or intoxication, 235; appearances in death from, 237.
- Coldness of the body in death, 75; in disease, 77; evidence from, as a sign of death, 78.
- Cole, case of, 414.
- Coleman, Mr. observations by, on drowning, 101.
- Combustion, human, trial involving the question of, 254; remarks on the supposed cases of, 255; alleged spontaneous, of the body, 257; spontaneous, of cotton and charcoal, 259.
- Concussion, distinction between, and intoxication, 417; manner in which it destroys life, 418; death from, after two years, 419.
- Cord, evidence from the mark of the, in hanging, 169, 176; two marks produced by the, 177.
- Coroners, Medical Jurisprudence necessary to, 26; sufficient attention not paid to the qualifications of, 27.
- Cotton, spontaneous combustion of, 260.
- Cowper, Spencer, trial of, for murder, 149; remarks upon the evidence, 152.
- Crès, Charles, case of, 423.
- Currie, Dr. on the fatal effects of cold and humidity, 237.
- Danks, trial of, for murder, 439.
- Davat, M., case of ruptured diaphragm by, 457.
- Dead, exhalations from the, supposed fatality of, 214.
- Death apparent, 62; real signs of, 66; conclusions respecting, 97.
- Declarations dying, law respecting the admission of, 300.
- Deveaux, case by, of supposed hanging, 172.
- Diaphragm, its condition in the drowned, 113; wounds of the, 454; case of presumed voluntary locomotion after a rupture of the, 457.
- Divers, their power of remaining submerged, 106.
- Drowning, 99; cause of death by, 103; post-mortem appearances, 110; whether death was caused by, or not, 116; whether accidental, suicidal or homicidal, 143; suicide by, 146.
- Duncan, Dr. medico-legal cases of burns, recorded by, 249.
- Ear, wounds of the, 433.
- Echymosis, nature of, 276; changes in, 277; a source of evidence, 278; from contusions on the dead body, 280; conclusions respecting, 282; from disease on the living, 283; from spontaneous changes in the dead, 286.
- Edwards, Dr. observations by, on the power of remaining submerged, 106; on the effects of cold, 235; on the duration of life in asphyxia, 59.
- Emphysema, 446.
- England, George, trial of, 400.
- Erysipelas, fatal, after wounds, 328.
- Esquirol, M. observations by, on hanging, 169.
- Essex, Earl of, suicide of the, 346.
- Evidence, identity of liquids for analysis, 14; notes or memoranda, when admitted in, 15; circumstantial, value of, in murder by wounding, 366.
- Extravasation, cerebral, questions respecting the cause of, 401; circumstances which accelerate or retard, 417.
- Eyes, state of the, in real death, 67; wounds of the, 432.
- Eye-lids, wounds of the, 431.
- Fabricius, Dr. trial of, for murder, 317.
- Face, wounds of the, 430.
- Facies Hippocratica, 66.
- Fagents, trial of the, 399.
- Fenning, Elizabeth, trial of, 21.
- Ferrari, Carlo, murder of, 291.
- Fire, fatal burns produced by, 247.

- Foderé on the appearances in death from starvation, 245; on the determination of questions of suicide, 376.
- Fractures and appearances of, in the living and dead subject, 282; of the skull, 420.
- Froth, mucous, in the drowned, evidence from, 126.
- Gall-bladder, wounds of the, 469.
- Gases from putrefaction in the drowned 155; poisoning, from the respiration of, 197.
- Gauteron, M. on drowning, 103.
- Gibbs, Dr. on the production of adipocere, 156.
- Gilchrist, trial of, 249.
- Giles, Mr. case by, 414.
- Godfrey, Sir E. murder of, 189.
- Good, Dr. on resuscitation from drowning, 104.
- Goodwyn, on the action of venous blood in asphyxia, 39; experiments on drowning, 100.
- Granet, case of, 242.
- Grave, influence of the depth of a, on putrefaction, 95.
- Gravel in the hands of the drowned, evidence from, 117.
- Green, Mary, trial for the murder of, 439.
- Hall, Dr. on hybernation, 82.
- Haller on the influence of respiration in the pulmonary circulation, 43.
- Hanging, cause of death by, 159; death a rapid consequence of, 163; resuscitation after, 164; post-mortem appearances in, 165; during life or after death, 167; mark produced by the cord in, 169; accidental, suicidal, or homicidal, 173; positions of the bodies of suicides in death from, 179.
- Harris, judicial murder of, 191.
- Hæmorrhage from wounds made during life, 272; wounds unattended by, 273.
- Head, wounds of the, 392; acts of volition and locomotion after severe injuries to the, 422.
- Heart, wounds of the, 448; presumed survivorship after, 451; foreign body lodged in the, 461.
- Heat, animal, disappearance of, in real death, 74; in malignant cholera, 76.
- Hebenstreit on the state of the diaphragm in the drowned, 113.
- Hemp and flax, spontaneous combustion of, 260.
- Hodgson, trial of, for murder, 140.
- Holwell, Mr. his account of the Black Hole of Calcutta, 205.
- Home, Sir E. his evidence in Sellis's case, 350.
- Honey, trial of, for murder, 356.
- Hopfenstock, M. on drowning, 101.
- Human combustion, 253.
- Hunter, John, on the cause of death by lightning, 222.
- Hybernation, resemblance of, to real death, 81.
- Indictment, form of, for murder. Vide *Appendix*.
- Induction, electric, effects of, 219.
- Infanticide, evidence respecting, 10.
- Insanity, signing of certificates of, 18.
- Insensibility in real death, 78.
- Interment, supposed danger of premature, 65, 97; influence of the period of, on putrefaction, 92.
- Intestines, ruptures of the, 465; wounds of the, 468.
- Intoxication, resemblance of, to concussion, 417.
- Iron-moulds on linen, mistaken for blood, 383.
- Irritability, cadaverous, 69.
- Judge, a knowledge of Medical Jurisprudence important to a, 25.
- Kay, Dr. theory of asphyxia, proposed by, 34.
- Kellie, Dr. observations by, on death from cold, 237.
- Kennedy and Brown, trial of, for murder by drowning, 133.
- Kidneys, wounds of the, 470.
- Kinloch, Sir A. trial of, 15.
- Lamb, Richard, trial of, 318.
- Lamp-black, spontaneous combustion of, 261.
- Larrey, on drowning, 100.
- Legallois, theory of asphyxia proposed by, 34.
- Lightning, effects produced by, 221; cause of death from, 222; appearances in death from, 223; returning stroke of, 226; supposed liquidity of the blood, and rapid putrefaction in bodies killed by, 225; articles of steel rendered magnetic by, 229.
- Liver, ruptures of the, 463; wounds of the, 469.
- Louis on the certainty of the signs of death, 67; on luxation of the vertebrae in hanging, 162.

- Lumsden, Ann, trial for the murder of, 140.
- Lungs, water in the, in drowning, 127; wounds of the, 445; dangerous after-effects of wounds of the, 447.
- Macarthy, trial of, for murder, 354.
- Mc Cormicks, trial of the, 407.
- Mackenzie, trial of, for murder, 331.
- Macklin, trial of, 432.
- Macmillan and Lawson, trial of, for murder, 336.
- Mahon, observations by, on apparent death, 64.
- Marc, M. on drowning, 101.
- Marshall, Mr. observations by, on diving, 106.
- Martin, Eliz. trial for the murder of, 147.
- Mayhem, or maiming, legal meaning of, 491; ancient and modern laws relating to, 493.
- Moir, Capt. trial of, for murder, 333.
- Morgagni on cadaverous rigidity, 71; on resuscitation, from drowning, 104.
- Mouth, wounds of the, 434.
- Muccia, Paolo, insubmersibility of, 153.
- Murder, definition of, in the English law, 297; and manslaughter, punishment of, 472; distinction between, and manslaughter, 475; death must take place within a year and a day, 477.
- Murrow, trial of, 486.
- Muscles, state of the, in real death, 69.
- Nairne and Ogilvie, trial of, 21.
- Neck, wounds of the, 435.
- Nesbitt, case of, 302.
- Norkott, evidence in the case of, 370.
- Nose, wounds of the, 433.
- Oesophagus, wounds of the, 453.
- Operations, death following, 334.
- Orbit, penetrating wounds of the, 432.
- Orfila, observations by, on putrefaction, 88.
- Organs, genital, wounds of the, 471.
- Ova, deposition of, on the dead, 93.
- Pace, trial of, 329.
- Patch, circumstantial evidence in the case of, 369.
- Paré, Amb. on the appearances in drowned bodies, 112; on the proofs of drowning, 116.
- Panyer, John, trial of, 495.
- Penal code of France, relating to wounds, 498.
- Penis, wounds of the, 471.
- Pett, Grace, alleged case of spontaneous combustion of, 256.
- Phillips, trial of, 315.
- Phlebitis, fatal, following venæsection, 339.
- Piorry, M. on drowning, 125.
- Poisoning, medical evidence in cases of, 9.
- Privies, fatal exhalations from, 210.
- Pugh, Williams and Matthews, trial of, for murder, by drowning, 134.
- Putrefaction a sign of death, 83; phenomena of, 84; conditions required for the establishment of, 86; modified by numerous circumstances, 89; entire destruction of the body by, 96.
- Ready and Mullaney, trial of, 395.
- Respiration, arrest of, in asphyxia, 43; in real death, 79; voluntary suspension of, 80; in hybernating animals, 82.
- Resuscitation, possibility of, in drowning, 107; in hanging, 163.
- Richman, Prof. death of, from lightning, 227.
- Rigidity, cadaverous, 70; cause of, 72; in the living body, 73; a sign of real death, 74.
- Robinson, trial of, for manslaughter, 328.
- Scalp, wounds of the, 392; danger from, 393.
- Sellis, suicide of, 349.
- Skin, state of, in real death, 68; discolouration of the, in the drowned, 111.
- Skull, fractures of the, 420.
- Sloane, Sir Hans, evidence by, on a case of drowning, 151.
- Smothering, death from, 214.
- Soil, influence of, on putrefaction, 94.
- Spleen, ruptures of the, 464; wounds of the, 470.
- Spontaneous combustion, 259.
- Spots of blood, identification of, 376; of lemon-juice and rust on weapons, 378.
- Standfield, Sir J. murder of, by strangulation, 190.
- Starvation, symptoms preceding death from, 239; period at which it proves fatal, 240; cases of voluntary, 241; appearances in death, from, 243; legal questions respecting, 247.

- Statute law relative to wounds, examination of, 477; defects in the, 490, 495.
- Stomach, water in the, in drowning, 119; ruptures of the, 465; wounds of the, 467.
- Stout, Sarah, trial for the supposed murder of, 149.
- Strangulation, supposed buoyancy of the body after, 155; death from, 186; post-mortem appearances in, 187; accidental, suicidal, or homicidal, 191.
- Suffocation, causes of, 196; from carbonic acid, 198; the vapour of charcoal or coal, 202; from confined air, 204; from sulphuretted hydrogen, 208; from the exhalations of privies, 210; from coal-gas, 212; from the effluvia of putrescent bodies, 214.
- Sugillation, 284.
- Suicides, wounds inflicted by, 342.
- Sullivan, trial of, 311.
- Sulphuretted hydrogen, poisoning by, 208; extricated from the soil of privies, 210; means of recognizing the presence of, 211.
- Swift, trial of, 402.
- Syncope, difference between it and asphyxia, 31.
- Syncopal asphyxia, 103.
- Technical terms, employment of, in evidence, 22.
- Testicles, wounds of the, 471.
- Tetanus fatal, consequent on wounds, 330.
- Thorax, wounds of the, 444.
- Townshend, Col. case of, 80.
- Trachea, water in the, in drowning, 125; wounds of the, 437.
- Vertebræ, fractures and luxations of the, in hanging, 162, 177.
- Vibices on the dead body, 287.
- Violence, marks of, on the drowned, 130; on the hanged, 175.
- Viscera, change in the colour of the, in drowned subjects, 133; wounds of the, 465.
- Viterbi, case of, 241.
- Uterus, injuries of the, 464.
- Vitriol, oil of, a wound not produced by in law, 486; wilful throwing of on the person, 488.
- Ward, Eliza, trial of, 20.
- Water, in the stomachs and lungs of the drowned, 115; evidence from, in drowning, 119, 127; putrefaction of the body in, 156.
- Wilkins, Bishop, 104.
- Wilkinson, trial for the murder of, 133.
- Winslow, on apparent death, 63.
- Witness, medical qualifications of a, 7.
- Wounds, inspection of the bodies of persons dead from, 265; examination of, 266; whether mortal or not, 269; whether inflicted during life or after death, 272; conclusions respecting, 282; detection of, long after death, 294; whether the cause of death or not, 297; fatal secondary consequences of, 324; self-inflicted or not, 341; accidental origin of, 389; of the head, 392; of the brain, 421; of the face, 430; of the neck, 435; of the thorax, 444; of the diaphragm, 454; of the abdomen, 461; legal relations of, 472; legal definition of, 480; surgical definitions of, 486; meaning of, in the law of France, 489.

FINIS.



